PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

ZOOLOGICAL SOCIETY

OF LONDON

FOR THE YEAR

1872.

PRINTED FOR THE SOCIETY,
AND SOLD AT THEIR HOUSE IN HANOVER SQUARE.

LONDON:
MESSRS. LONGMANS, GREEN, READER, AND DYER,
PATERNOSTER ROW.



PRINTED BY TAYLOR AND FRANCIS,
RED LION COURT, FLEET STREET.

LIST

OF THE

CONTRIBUTORS,

With References to the several Articles contributed by each.

Page

ADAMS, HENRY, F.L.S.

Further Descriptions of new Species of Shells collected by Robert M'Andrew, Esq., in the Red Sea. (Plate III. figs. 1–16) 9

Descriptions of fourteen new Species of Land and Marine Shells. (Plate III. figs. 17–30.) 12

Description of a new Species of *Geotrochus* from the Island of New Britain. (Plate XLII.) 614

ANDERSON, ANDREW, C.E., F.Z.S.

Notes on the Raptorial Birds of India.—Part II. 68

Additional Notes on the Raptorial Birds of North-western India 619

ANDERSON, JOHN, M.D., F.L.S., F.Z.S., Director of the Indian Museum, Calcutta.

Notes on *Rhinoceros sumatrensis*, Cuvier 129

On *Manouria* and *Scapia*, two Genera of Land-Tortoises . 132

Further Remarks on the External Characters and Anatomy of *Macacus brunneus*. (Plate XII.) 203

Page

On some Persian, Himalayan, and other Reptiles 371

On a supposed new Monkey from the Sunderbunds to the East of Calcutta..... 529

Notice of a Memoir on the Osteology and Dentition of *Hylomys*..... 683

ANGAS, GEORGE FRENCH, F.L.S., F.R.G.S., C.M.Z.S.

Descriptions of ten new Species of Land and Marine Shells. (Plate XLII.) 610

Description of a new Species of *Voluta*. (Plate XLII.) . 613

AUSTEN, Major H. H. GODWIN-, F.R.G.S., F.Z.S., Deputy Superintendent, Topographical Survey of India.

Exhibition of a Skin of *Ceriornis blythii*..... 496

Descriptions of new Land and Freshwater Shells from the Khási, North Cachar, and Nágá Hills, N.E. Bengal. (Plate XXX.) 514

BARTLETT, A. D., Superintendent of the Society's Gardens.

Additional Notes on the Breeding of the Hippopotamus in the Society's Gardens 819

BEAVAN, Lieut. REGINALD, F.R.G.S., Revenue Survey Department of India.

Descriptions of two imperfectly known Species of Cyprinoid Fishes from the Punjab, India..... 150

BENNETT, Dr. GEORGE, F.Z.S.

Extract of a Letter from, relating to a pair of *Didunculi* and other Birds living in the Botanic Gardens, Sydney 636

BOWERBANK, JAMES SCOTT, LL.D., F.R.S., &c.

Contributions to a General History of the *Spongiadæ*. —Part I. (Plates V. & VI.)..... 115

Contributions to a General History of the *Spongiadæ*. —Part II. (Plates X. & XI.) 196

Contributions to a General History of the *Spongiadæ*. —Part III. (Plates XLVI.–XLIX.)..... 626

Page

BRAZIER, JOHN, C.M.Z.S., M.R.S.N.S.W.

Descriptions of seven new Species of Land and Marine Shells from the Solomon Islands, Western Polynesia, and Australia. (Plate IV. figs. 6–10.) 20

Observations on the Habitats of certain Volutes 23

A List of the *Cyprœidæ* found on the Coast of New South Wales..... 81

Descriptions of three new Species of Marine Shells from Australia. (Plate XLIV.) 616

Descriptions of six new Species of Land-Shells from Australia and Lord Howe's Island 617

Synonymy of, and Remarks upon, Australian and Western Polynesian Land-Shells..... 805

A List of the Species of *Cassididæ* found on the Coast of New South Wales, together with Remarks on their Habits and Distribution..... 837

BROOKE, Sir VICTOR, Bart., F.Z.S.

On *Hydropotes inermis* and its Cranial Characters, as compared with those of *Moschus moschiferus* 522

On a supposed new Species of Gazelle from Eastern Africa. (Plate XLI.) 601

On the Royal Antelope, and allied Species of the Genus *Nanotragus*. (Plate LIII.)..... 637

On a new Species of Antelope living in the Society's Menagerie. (Plate LXXV.) 874

BROOKS, W. E., of Etawah.

On the Imperial Eagles of India 502

BUCKLEY, HENRY, F.Z.S.

On some new or rare Birds' Eggs..... 625

BURMEISTER, Dr. H., F.M.Z.S.

Synopsis of the *Lamellirostres* of the Argentine Republic . 364

Page

BUTLER, ARTHUR GARDINER, F.L.S., F.Z.S.

A Synonymic List of the Species formerly included in the Genus *Pieris*; with all others described since the subdivision of the Group by recent Authors 26

CAMBRIDGE, Rev. O. P., M.A., C.M.Z.S.

General List of the Spiders of Palestine and Syria, with Descriptions of numerous new Species and Characters of two new Genera. (Plates XIII.–XVI.)..... 212

Descriptions of twenty-four new Species of *Erigone*. (Plates LXV. & LXVI.) 747

CLARK, JOHN W., F.Z.S.

Notes on the Visceral Anatomy of the Hippopotamus .. 185

COX, JAMES C., M.D., C.M.Z.S.

Descriptions of new Land-Shells from Australia and the South-Sea Islands. (Plate IV. figs. 1–15.)..... 18

DARWIN, FRANK, B.A., and A. H. GARROD, B.A., F.Z.S., Prosector to the Society.

Notes on an Ostrich lately living in the Society's Collection 356

DRESSER, HENRY E., F.Z.S.

Exhibition of, and Remarks on, some Skins and Eggs of various Species of *Reguloides* and *Phylloscopus* 25

Exhibition of some Eggs of the Marbled Duck (*Querquedula marmorata*) 605

Exhibition of, and Remarks upon, Skins of various Eagles (*Aquila*)..... 863

ELLIOT, DANIEL G., F.L.S., F.Z.S.

On *Felis pardinoides*, J. E. Gray..... 203

Page

FINSCH, Dr. OTTO, C.M.Z.S., and HARTLAUB, Dr. G., F.M.Z.S.

On a fourth Collection of Birds from the Pelew and Mackenzie Islands 87

FLOWER, WILLIAM HENRY, F.R.S., F.L.S., V.P.Z.S., Conservator of the Museum of the Royal College of Surgeons, and Hunterian Professor.

Note on the Anatomy of the Two-spotted Paradoxure (*Nandinia binotata*) 683

GARRETT, ANDREW, of Tahiti.

List of Species of *Mitridæ* collected at Rarotonga, Cook's Islands, with Notes, also Descriptions of new Species..... 839

Description of a new Species of *Scissurella* from the Paumotu Islands 878

Descriptions of two new Species of *Separatista* 878

Descriptions of two new Species of *Cæcum* from the Viti Islands 879

GARROD, ALFRED HENRY, B.A., F.Z.S., Prosector to the Society.

On the Mechanism of the Gizzard in Birds 525

Notes on the Anatomy of the Huia Bird (*Heteralocha gouldi*) 643

Note on the Tongue of the Psittacine genus *Nestor* 787

Note on the Placenta of the Hippopotamus 821

GARROD, A. H., B.A., F.Z.S., Prosector to the Society, and FRANK DARWIN, B.A.

Notes on an Ostrich lately living in the Society's Collection 356

GOULD, JOHN, F.R.S., V.P.Z.S.

Exhibition of, and Remarks on, a Specimen of Ross's Gull (*Larus rossi*) in adult Summer Plumage 1

Page

GRAY, JOHN EDWARD, Ph.D., F.R.S., F.L.S., F.Z.S.

Notes on a new Species of Tapir (*Tapirus leucogenys*) from the Snowy Regions of the Cordilleras of Ecuador, and on the Young Spotted Tapirs of Tropical America. (Plates XXI. & XXII.) 483

On the Genus *Chelymys* and its Allies from Australia. (Plates XXVII.–XXIX.) 504

On *Peltastes forstenii*, a Species of Land-Tortoise from Celebes. (Plate XLIII.) 615

Description of a Young Tapir from the Peruvian Amazons. (Plate XLV.) 624

On the Sea-bear of New Zealand (*Arctocephalus cinereus*) and the North-Australian Sea-bear (*Gysophoca tropicalis*) . 653

Description of the younger Skull of Steller's Sea-bear (*Eumetopias stelleri*) 737

Additional Notes on *Arctocephalus cinereus* and on *Gypsophoca* 743

Notes on Corals from the South and Antarctic Seas. (Plates LXII.–LXIV.) 744

Notes on *Propithecus*, *Indris*, and other Lemurs (*Lemurina*) in the British Museum. (Plates LXIX.–LXXI.) 846

On the Fossane of D'Aubenton (*Fossa d'aubentonii*). (Plate LXXIV.) 869

On the *Actinemys marmorata* of Mr. Lord from British Columbia 872

GULLIVER, GEORGE, F.R.S., F.Z.S.

On the Œsophagus of the Pied Hornbill (*Toccus melanoleucus*): being an Appendix to a paper on the Taxonomic Character of the Muscular Sheath of that Tube as regards Sauropsida 16

On the size of the Red Corpuscles of the Blood of the *Salmonidæ* and some other Vertebrates 833

Page

GÜNTHER, ALBERT, M.D., Ph.D., F.R.S., F.Z.S.

On two Species of *Hydrosaurus* from the Philippine Islands. (Plates VII. & VIII.) 145

On a new Genus of Characinoid Fishes from Demerara ... 146

On the Reptiles and Amphibians of Borneo. (Plates XXXV.–XL.) 586

Note on *Hyla punctata* and *Hyla rhodoporus* 662

Note on the Black Snake of Robben Island, South Africa.. 836

Note on a hitherto unpublished Drawing in the Buchanan-Hamilton Collection, representing *Barbus beavani* 875

HARTLAUB, Dr. G., F.M.Z.S., and FINSCH, Dr. O., C.M.Z.S.

On a fourth Collection of Birds from the Pelew and Mackenzie Islands 87

HIGGINS, EDMUND THOMAS, F.Z.S.

Descriptions of new Species of Shells discovered by Mr. Clarence Buckley in Ecuador. (Plate LVI.) 685

HOLDSWORTH, E. W. H., F.L.S., F.Z.S.

Catalogue of Birds found in Ceylon; with some Remarks on their Habits and Local Distribution, and Descriptions of two new Species peculiar to the Island. (Plates XVII.–XX.) 404

Note on a Cetacean observed on the West Coast of Ceylon 583

HUDSON, WILLIAM H., C.M.Z.S.

On the Birds of the Rio Negro of Patagonia. With Notes by P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society. (Plate XXXI.) 534

On the Habits of the Swallows of the Genus *Progne* met with in the Argentine Republic. With Notes by P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society .. 605

Notes on the Habits of the Churinche (*Pyrocephalus rubineus*) 808

On the Habits of the Vizcacha (*Lagostomus trichodactylus*) 822

Further Observations on the Swallows of Buenos Ayres .. 844

Page

HUTTON, Captain F. W., C.M.Z.S.

Descriptions of some new Starfishes from New Zealand .. 810

HUTTON, Capt. THOMAS, C.M.Z.S.

On the Bats of the North-western Himalayas. With Notes and Corrections in Nomenclature by Prof. W. PETERS, F.M.Z.S. 690

KREFFT, GERARD, Curator and Secretary, Australian Museum, Sydney, New South Wales, C.M.Z.S.

Letter from, on the Species of Wombat (*Phascolomys*) .. 795

LE CONTE, JOHN L., M.D., C.M.Z.S.

On *Platypsyllidæ*, a new Family of Coleoptera. (Plate LXVIII.) 799

MACALISTER, ALEXANDER, M.B. (T.C.D.), Professor of Zoology in the University of Dublin, President of the Royal Geological Society of Ireland.

Notes on a Specimen of the Broad-headed Wombat (*Phascolomys latifrons*) 497

MOORE, FREDERIC.

Descriptions of new Indian Lepidoptera. (Plates XXXII.–XXXIV.) 555

MURIE, JAMES, M.D., F.L.S., F.G.S., F.Z.S.

On the Skeleton of *Todus*, with Remarks as to its Allies. (Communicated by Professor NEWTON, F.R.S., V.P.Z.S.) (Plate LV.) 664

On the Indian Wild Dog 715

Observations on the Macaques.—I. The Bornean Ape .. 721

On the Cranial Appendages and Wattles of the Horned Tragopan. (Plates LX. & LXI.) 730

Page

Observations on the Macaques.—II. Bélanger's Monkey.. 770

Observations on the Macaques.—III. The Formosan or Round-faced Monkey 771

Observations on the Macaques.—IV. The Japanese Monkey 780

Newton, Alfred, M.A., F.L.S., F.Z.S., Professor of Zoology and Comparative Anatomy in the University of Cambridge.

Exhibition of, and Remarks on, a Specimen of Ross's Gull (*Larus rossi*) 1

Owen, Prof. Richard, F.R.S., F.Z.S., &c.

Letter from, addressed to the Secretary concerning the Remains of *Aptornis* found in Glenmark Swamp, New Zealand 24

Notice of his Eighteenth Memoir on the extinct Birds of the Genus *Dinornis* 605

Notice of his Nineteenth Memoir on the extinct Birds of the Genus *Dinornis* 682

Notice of his Fourth Memoir on the Osteology of the Marsupialia 865

Pain, Capt. Henry.

Letter from, containing remarks on the Sea-lion (*Otaria jubata*) and other Seals 681

Peters, Professor William, M.D., Ph.D., F.M.Z.S.

Note on a Collection of small Mammalia made by Mr. Monteiro in Angola 363

On the Bats of the North-western Himalayas. By Capt. Thomas Hutton, C.M.Z.S. With Notes and Corrections of Nomenclature by Prof. W. Peters..... 690

Reinhardt, Prof. J., F.M.Z.S.

Letter from, on the locality and identity of the Spider Monkey (*Ateles*) of Mexico 797

Page

RIEDEL, T. G. F., C.M.Z.S.

Letter from, addressed to Viscount Walden, with reference to the true locality of *Tanysiptera riedeli* 1

ROWLEY, GEORGE DAWSON, M.A., F.Z.S.

Exhibition of a Specimen of the North-American *Zonotrichia albicollis*, taken near Brighton 681

SANDERS, ALFRED, F.Z.S.

Notes on the Myology of *Liolepis belli* 154

SAUNDERS, HOWARD, F.Z.S.

On a new Species of Green Woodpecker from Southern Europe 153

On the Occurrence of *Falco barbarus* and *Cypselus pallidus* on the Continent of Europe 356

On the Introduction of *Anser albatus* of Cassin into the British Avifauna 519

SCHOMBURGK, Dr. ROBERT, Director of the Botanic Garden, Adelaide, South Australia, C.M.Z.S.

Letter from, on apparently reasoning-powers exhibited by a Monkey 525

SCLATER, PHILIP LUTLEY, M.A., Ph.D., F.R.S., Secretary to the Society.

On the Quadrumana found in America north of Panama. (Plates I. & II.) 2

Report on the Additions to the Society's Menagerie in December 1871 23

On Kaup's Cassowary (*Casuarius kaupi*), and on the other known Species of the Genus. (Plate IX.) 147

Report on the Additions to the Society's Menagerie in January 1872 183

Announcement of the addition to the Society's collection of a female Sumatran Rhinoceros 185

Report on the Additions to the Society's Menagerie in February 1872. (Plates XXIII.–XXVI.) 493

Page

Exhibition of a Skin of the Yellow-billed Cuckoo (*Coccyzus americanus*) from Buenos Ayres 496

On the Birds of the Rio Negro of Patagonia. By W. H. Hudson, C.M.Z.S. With Notes by P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society. (Plate XXXI.).. 534

Report on the Additions to the Society's Menagerie in March 1872 602

Exhibition of the Skull of a Hairy Tapir (*Tapirus roulini*), and Remarks on its Differences from that of *T. terrestris* .. 604

On the Habits of the Swallows of the Genus *Progne* met with in the Argentine Republic. By W. H. Hudson, C.M.Z.S. With Notes by P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society 605

Report on Additions to the Society's Menagerie in April 1872. (Plates L.–LII.) 635

Observations on the Birds of St. Lucia. By the Rev. J. E. Semper, Colonial Chaplain. With Notes by P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society .. 647

On the Species of Quadrumana collected by Mr. Buckley in Ecuador. (Plate LIV.) 663

Exhibition of a specimen of *Coccyzus erythrophthalmus* killed in Ireland 681

Additional Notes on rare or little-known animals now or lately living in the Society's Gardens. (Plates LVII.–LIX.) 688

Report on Additions to the Society's Menagerie in May 1872 728

Exhibition, for Mr. Vincent Legge, of a pair of a new Ceylonese bird, proposed to be called *Prionochilus vincens*.. 729

Report on the Additions to the Society's Menagerie during the months of June, July, August, and September, 1872. (Plate LXVII.) 789

Announcement of the Birth of a Hippopotamus in the Society's Gardens 795

Page

Remarks on a Mexican Spider Monkey (*Ateles*) in the Berlin Museum 798

Remarks on the two Livingstone Expeditions into Inner Africa 819

Report on the Additions to the Society's Menagerie in October and November 1872. (Plate LXXII.) 860

Exhibition of a Nest of the Tijereta (*Milvulus tyrannus*) containing eggs of *Molothrus bonariensis* 862

Scott, Walter J., C.M.Z.S.

Letter from, addressed to the Secretary, respecting the supposed "Native Tiger" of Queensland 355

Second letter from, on the existence of a "Native Tiger" in Queensland 796

Semper, Rev. J. E., Colonial Chaplain.

Observations on the Birds of St. Lucia. With Notes by P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society 647

Sharpe, Richard Bowdler, F.L.S., F.Z.S.

Exhibition of Specimens of Blue Rock-Thrushes (*Petrocossyphus*) 496

Contributions to the Ornithology of Madagascar.—Part III. (Plate LXXIII.) 866

Swinhoe, Robert, F.Z.S., H.B.M. Consul at Ningpo.

Descriptions of two new Pheasants and a new *Garrulax* from Ningpo, China 550

Letter from, on a Deer seen in captivity in Shanghai 798

Notes on Chinese Mammalia observed near Ningpo..... 813

Walden, Arthur, Viscount, F.R.S., President of the Society.

Notice of an Appendix to his Memoir on the Birds of Celebes 605

LIST OF PLATES.

Plate		Page
I.	*Nyctipithecus rufipes*	2
II.	*Ateles vellerosus*	
III.	New Species of Shells from the Red Sea and other localities	9
IV.	New Shells from Australia and the Western Pacific Islands	18
V.	*Tethea muricata, T. unca, T. ingalli,* and *T. norvagica*	115
VI.	*Halispongia choanoides*	
VII.	*Hydrosaurus cumingii*	145
VIII.	—— *nuchalis*	
IX.	*Casuarius kaupi*	147
X.	*Geodia m'andrewii*	196
XI.	—— *barretti*	
XII.	*Macacus brunneus*	203
XIII. XIV. XV. XVI.	Spiders of Palestine and Syria	212
XVII.	*Erythrosterna hyperythra*	404
XVIII.	*Brachypteryx palliseri*	
XIX.	*Arrenga blighi*	
XX.	Fig. 1. *Zosterops palpebrosus*	
	Fig. 2. —— *ceylonensis*	
XXI.	*Tapirus leucogenys*	483
XXII.	Fig. 1. *Tapirus ænigmaticus*	
	Fig. 2. —— *ecuadorensis* jr.	
	Fig. 3. —— *terrestris* jr.	
XXIII.	*Rhinoceros lasiotis*	494
XXIV.	*Macacus rufescens*	495
XXV.	—— *rheso-similis*	
XXVI.	*Casuarius bicarunculatus*	
XXVII.	*Chelymys victoriæ*	504
XXVIII.	—— *krefftii*	
XXIX.	*Elseya latisternum*	
XXX.	Nágá and Khási Hills Shells	514
XXXI.	*Cnipolegus hudsoni*	534
XXXII. XXXIII. XXXIV.	New Indian Lepidoptera	555
XXXV.	Fig. A. *Draco cristatellus*	586
	Fig. B. —— *spilopterus*	

Plate		Page
XXXVI.	*Tiaris liogaster*	586
XXXVII.	Fig. A. *Lophocalotes interruptus*; Fig. B. *Tiaris miotympanum*; Fig. C. —— *sophiæ*	586
XXXVIII.	*Tiaris tuberculatus*	586
XXXIX.	Fig. A. *Calamaria gracillima*; Fig. B. *Simotes subcarinatus*	586
XL.	Fig. A. *Rana conspicillata*; Fig. B. *Hylorana jerboa*; Fig. C. *Polypedates signatus*	586
XLI.	*Gazella granti*	601
XLII.	New Australian and other Shells	610
XLIII.	*Peltastes forstenii*	615
XLIV.	New Species of *Cassis* and *Cypræa*	616
XLV.	*Tapirus peruvianus* jr.	624
XLVI.	*Geodia tuberculosa*	626
XLVII.	—— *tumulosa*	626
XLVIII.	*Pachymatisma areolata*	626
XLIX.	*Hymeniacidon angulata*	626
L.	*Pteromys magnificus*	635
LI.	*Tapirus bairdi* jr.	635
LII.	—— *terrestris*	635
LIII.	*Nanotragus pygmæus*	637
LIV.	*Ateles fusciceps*	663
LV.	Osteology of *Todus*	664
LVI.	New Shells from Ecuador	685
LVII.	*Ateles rufiventris*	688
LVIII.	*Capra picta* ♀	688
LIX.	*Cervus savannarum* ♂	688
LX. LXI.	Structure of *Ceriornis satyra*	730
LXII. LXIII. LXIV.	New Antarctic Corals	744
LXV. LXVI.	New Species of *Erigone*	747
LXVII.	*Rhinoceros sumatrensis*	794
LXVIII.	*Platypsylla castoris*	799
LXIX.	*Prosimia rufipes*: fig. 1, ♂; fig. 2, ♀	846
LXX.	*Opolemur milii*: fig. 1, ♂; fig. 2, ♀	846
LXXI.	*Cheirogaleus typicus*: fig. 1, ♂; fig. 2, ♀	846
LXXII.	Fig. 1. *Cholopus hoffmanni*; fig. 2. *Ch. didactylus*	861
LXXIII.	*Oxylabes madagascariensis*	866
LXXIV.	*Fossa d'aubentonii*	869
LXXV.	*Nanotragus nigricaudatus*	874

PROCEEDINGS

OF THE

SCIENTIFIC MEETINGS

OF THE

ZOOLOGICAL SOCIETY OF LONDON.

January 2, 1872.

John Gould, Esq., F.R.S., V.P., in the Chair.

The following extract was read from a letter addressed to the Viscount Walden, President of the Society, by Mr. T. G. F. Riedel, Assistant Resident, Gorontalo, Celebes, with reference to the true locality of *Tanysiptera riedeli*:—

"Having been informed of your intention of publishing a complete description of the birds of Celebes, and seeing that Mr. G. R. Gray, in his 'Hand-list of Birds,' has placed *Tanysiptera riedeli* as an inhabitant of this island, I think it right to mention to you that this bird, described by M. Jules Verreaux in the 'Nouvelles Archives du Muséum d'Histoire Naturelle' for 1866, is really from Kordo, an island in the Bay of Geelvink, and not from Celebes."

Prof. Newton, F.R.S., exhibited and made remarks on a specimen of Ross's Gull (*Larus rossi*) in winter plumage, from the collection of the late Sir William Milner, which was stated to have been killed in Yorkshire in 1847.

Mr. Gould, F.R.S., exhibited and made remarks on a specimen of the same bird in adult summer plumage, from the Derby collection at Liverpool.

The following papers were read :—

1. On the Quadrumana found in America north of Panama. By P. L. Sclater, M.A., Ph.D., F.R.S.

[Received December 5, 1871.]

(Plates I. & II.)

In the 'Natural History Review' for 1861*, I wrote an article upon "The Northern Limit of the Quadrumana in the New World," and showed that these animals range much further northwards than had been then recorded in scientific works. I likewise endeavoured to put together all that was then known of the distribution of the species of Monkeys met with in Central America north of Panama.

My attention has been again drawn to this subject by the receipt by this Society of living specimens of several species of Quadrumana from various parts of the Central-American isthmus, and by the publication of an article by Dr. v. Frantzius in a recent number of Wiegmann's 'Archiv,' upon the Mammals of Costa Rica†; and I am now able to give some additional information as to the actual species of Quadrumana which are met with north of Panama, and their range and localities‡.

* Page 507 *et seqq.*

† Wiegmann's Archiv f. Nat. 1869, pt. i. p. 247.

‡ Our authorities on the mammals of America north of Panama are very few and meagre. I am acquainted with the following only specially relating to this subject:—

a. Mexico.

1. Wagler's "Einige Mittheilungen über Thiere Mexicos," in the 'Isis,' 1831, p. 510, which contains notices of four mammals, and the first description of *Bassaris astuta*.

2. M. H. de Saussure's articles on certain Mexican mammals in the Rev. et Mag. de Zool. for 1860 & 1861, with supplementary notices in 1865.

3. Von Müller's 'Reisen in Mexico,' Leipzig, 1864, which contains at the end of vol. iii. a list of Mexican vertebrates. It is, however, a mere compilation, full of egregious errors, and of no scientific value whatever.

b. Guatemala.

4. Mr. Tomes's Report on Mr. Salvin's collection of mammals made at Dueñas, in P. Z. S. 1861, p. 278. This contains an account of thirty-six species. Mr. Salvin subsequently made other collections of mammals in Guatemala, which were likewise entrusted to Mr. Tomes, but have never yet been reported upon.

c. Costa Rica.

5. "Die Säugethiere Costarica's, ein Beitrag zur Kenntniss der geographischen Verbreitung der Säugethiere Amerika's," von Dr. A. von Frantzius (Wiegm. Arch. 1869, i. p. 248), contains notices of about sixty species, some of which are not exactly determined, and others, I have good reason to believe, not quite correctly named.

d. Panama.

6. List of Mammals and Birds collected by Mr. Bridges near David, by P. L. Sclater, contains references to five species.

P.Z.S. 1872 Pl. I



NYCTICEBUS RUFIPES

BRITISH MUSEUM
28OC73





ATELES VELLEROSUS

BRITISH
2800 73
MUSEUM

These are, so far as I am yet acquainted with them, the following:—

1. SAIMIRIS ENTOMOPHAGA (D'Orb.); Is. Geoffr. Cat. Mamm. p. 38.

Saimaris sciurea, Sclater, P. Z. S. 1856, p. 139.

Chrysothrix sciurea, v. Frantzius, Wiegm. Arch. f. Nat. 1869, i. p. 260.

In 1856 I recorded the existence of a species of Squirrel Monkey in Central America, Mr. Bridges having procured, near David in Veragua, a skeleton of a species of this genus. Dr. v. Frantzius informs us that a *Saimaris* occurs in the warmer regions of Costa Rica, and refers the species to *S. sciurea*. But I have no doubt that the Central-American form is the black-headed *S. entomophaga*, as there is a skin of this species in the British Museum from Veragua (*Arcé*), and likewise a specimen of the same animal obtained by Capt. Kellett and Commander Wood during their survey of the Pacific coast of Central America.

2. NYCTIPITHECUS LEMURINUS, Is. Geoffr.

In a collection recently formed in the highlands of Costa Rica by Dr. van Patten is a skin of this *Nyctipithecus*, which agrees in every respect with a skin of the same animal from Bogota; so that this Columbian form evidently ranges thus far north.

3. NYCTIPITHECUS RUFIPES, sp. nov. (Plate I.)

On the 12th of June last we purchased a living specimen of a *Nyctipithecus*, which had been obtained at San Juan del Norte, Nicaragua. Not being able to examine this animal carefully whilst alive, I registered it as *N. lemurinus*, believing that that species was the most likely to occur so far north. It is since dead, and I now exhibit its skin and skull.

The animal is certainly *not N. lemurinus*, but belongs to the short-haired and cylindrical-tailed section of the genus containing *N. trivirgatus* and its allies *N. felinus* and *N. oseryi*. It appears, however, as might have been expected from its locality, to be distinct from all of these, and to belong to an undescribed species which I propose to call

NYCTIPITHECUS RUFIPES, sp. nov.

Supra cinereus, rufescente partim irroratus: subtus rufescenti-canus: tæniis verticis tribus indistincte nigris: manibus pedibus et caudæ dimidio basali rufis: hujus apice rufescenti-nigro: auribus prominentibus nudis: long. tota corp. 11, *caudæ* 16.

Hab. Nicaragua.

In the form of the stripes on the head this species seems to agree best with *N. trivirgatus*; but the long castaneous patch on the back of that species is wholly wanting in *N. rufipes*. Moreover the head-stripes are narrower and much less distinct, and leave a prominent triangular white patch over each eye. The rufous hands and feet

are also peculiar to the species. The ear-conchs are large and prominent, and in the present specimen nearly, if not quite, devoid of hairs. It is, however, possible that this may be partly due to the animal having been sick in captivity.

From *N. felinus*, of which I exhibit a fine Nattererian specimen, the present species is at once distinguishable by its much paler colour and by the indistinctness of the head-stripes.

I trust that we shall shortly receive further examples of this interesting animal, so that I may be enabled to give a more perfect account of its distinctive characters.

4. Cebus hypoleucus, Geoffr.; Sclater, Nat. Hist. Rev. 1861, p. 509; v. Frantzius, Wiegm. Arch. 1869, p. 259; Gray, Zool. Voy. Sulphur, p. 10.

The only *Cebus* of which I have seen Central-American specimens is *Cebus hypoleucus*, or the nearly allied form of it (if distinct) called by Dr. Gray *Cebus leucocephalus* (P. Z. S. 1865, p. 825). Of this there are specimens in the British Museum from Costa Rica and Nicaragua, collected in both localities by Arcé.

5. Ateles melanochir.

Ateles melanochir, Desm. Mamm. p. 76.

Ateles geoffroii, Kuhl.

Ateles melanochir, *A. ornatus* et *A. albifrons*, Gray, Cat. Monkeys, pp. 43, 44.

Ateles variegatus et *Eriodes frontatus*, v. Frantzius, Wiegm. Arch. 1869, p. 258.

In some recent remarks on this species (P. Z. S. 1871, p. 226) I came to the conclusion that *A. ornatus* and *A. melanochir* were mere varieties of the same species. We have recently received more living examples of this Spider Monkey from Nicaragua. Amongst them is one nearly resembling the fine grey specimen formerly in General Fox's possession, upon which Dr. Gray has based his *A. albifrons*. This I now believe to be also merely a variety of *A. melanochir*, of the variations in colour of which Dr. v. Frantzius has already spoken (*l. s. c.* p. 257).

I have given the evidence as to the probable occurrence of this species in Southern Mexico in my article in the 'Nat. Hist. Review,' 1861, p. 509.

In Guatemala, Mr. Salvin tells me, this species is confined to the Pacific coast-region. A skin of Mr. Salvin's in the British Museum is of the variety called *A. ornatus* by Dr. Gray, which I have figured on a former occasion (P. Z. S. 1871, pl. xv.). Dr. v. Frantzius tells us that a specimen in the Basel Museum obtained in the same country by Dr. Bernouilli does not differ from Costa-Rican examples. There is also in the British Museum a skin of this Spider Monkey procured by Salvin's collector Arcé near Calovevora, in Veragua (belonging to the form *A. ornatus*); so that this species of *Ateles* appears to extend over Central America from Southern Mexico to Veragua.

We have at various times received at least a dozen living specimens of this Spider Monkey. Nearly all of these, so far as I have been able to ascertain, have been obtained by the West-Indian Mail Co.'s steamers at Greytown, Nicaragua.

6. ATELES VELLEROSUS. (Plate II.)

Mr. Salvin first informed me that a species of *Ateles* quite different from that of the Pacific coast-region occurs in the forests of Northern Vera Paz, where it is abundant in some localities. Mr. Salvin brought back from one of his expeditions a very imperfect skin of this animal, which is now in the British Museum.

Quite recently I have met with a skin of a Mexican Monkey, belonging to Mr. E. Gerrard, jun., which I have little doubt is of the same species. Mr. Gerrard obtained it from M. A. Boucard, along with other Mexican mammals, which M. Boucard believes were procured near Acapulco. I have taken this skin to the British Museum, and find it undoubtedly identical with the specimen upon which Dr. Gray founded his *Ateles vellerosus* (P. Z. S. 1865, p. 733, et Cat. Monkeys, p. 44). Mr. Salvin's Guatemalan skin appears to be rather more shortly haired, and is quite, or nearly altogether, black above, but must, I think, be referred to the same species.

Ateles vellerosus much resembles *A. belzebuth* in general colour, but has much longer hairs, particularly on the forehead and sides. The typical specimen of *A. vellerosus* is obviously young and small, but agrees otherwise perfectly with the Mexican skin before mentioned, which I now exhibit, and from which the accompanying figure (Plate II.) has been taken*. In my opinion two stuffed specimens in the British Museum, determined as *A. belzebuth* (one received from this Society in Dec. 1855, and the other purchased of Cross in 1843) should also be referred to *Ateles vellerosus*.

7. ATELES ATER, F. Cuv.

The Black-faced Spider Monkey appears to come up as far north as the vicinity of Panama; at least we have recently received several living specimens of this species by the West-Indian mail-steamer, which are said to have been obtained at Colon.

On the 11th of November last we obtained from Mr. J. B. Dawes, F.Z.S., a fine female example of this species, which, Mr. Dawes informs me, was procured at Colon †.

8. MYCETES VILLOSUS, Gray.

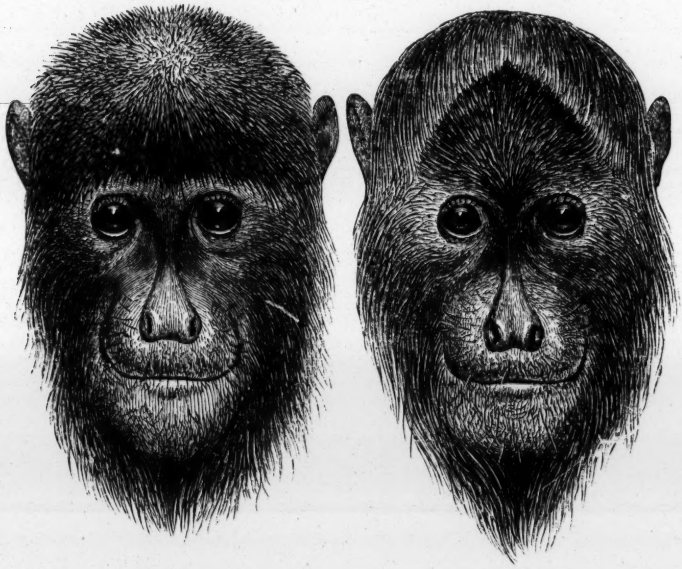
Mr. Salvin has often spoken to me of the Black Howler of Vera Cruz; but it is only recently that I have had an opportunity of ex-

* This specimen may be diagnosed as follows:—

Supra niger: dorso superiore brunnescente, inferiore cum lateribus fulvis: corpore subtus et artubus intus albis: pilis omnibus elongatis, in fronte reversis, in vertice projectis: long. corp. 16, *caudæ* 19.

† We have likewise received living specimens of *A. ater* from Cartagena; so that there is no question of the occurrence of this species in the northern part of the U.S. of Columbia.

amining a skin of this animal, obtained by him in that district in May 1862, which is now in the British Museum, where it has been named *Mycetes caraya*. As might have been expected, it is decidedly of a different species from the *M. caraya* of S. Brazil, Paraguay, and Bolivia, being the most northern species of the genus, while *Mycetes caraya* is the most southern. It differs from *M. caraya* in its long soft hairs, which below, towards their bases, show a rufescent tinge, in the hair on the face being inclined forward instead of reversed, as will be seen in the accompanying figures, and in the



Mycetes villosus. *Mycetes caraya.*

colour of the female and young being black like that of the male. Other differences would be, no doubt, found on comparison, which, however, requires further materials for the purpose. But I have no doubt of the distinctness of the northern species; and I believed it to be undescribed, until I compared it with the single imperfect stuffed specimen in the British Museum upon which *Mycetes villosus*, Gray*, was founded. This is stated to be from "Brazil;" but I think it probable that there has been a mistake in the locality, and that it is identical with the Guatemalan animal.

* Ann. Nat. Hist. xvi. p. 220 (1845), and Cat. Monkeys, p. 41.

Mr. Salvin has furnished me with the following notes on this species, as observed by himself in Guatemala:—

"The *Mycetes* of Guatemala is commonly known as the 'Mono.' It is abundant throughout the virgin forests of the eastern portion of the republic, but is unknown in the forest-clad slopes which stretch towards the Pacific Ocean. In the former region it is found at various altitudes over a wide expanse of country. I have heard its cry on the shores of the lake of Yzabal; and all through the denser forests of the valley of the river Polochic it is very common, from the steep mountain-road which lies between the upland village of Purulá and S. Miguel-Tucuru, and especially in the wilderness of uninhabited forest which stretches from Teleman to the lake of Yzabal. In the unbroken forest-country, which occupies the whole of the northern portion of Vera Paz from Coban and Cahabon to the confines of Peten, it is also abundant; for seldom an hour passes but the discordant cry of the Mono strikes upon the ear of the traveller as he threads the lonely path to Peten. The elevation of this district varies from about 700 to 3000 feet; and the *Mycetes* is found at all heights. When travelling through this forest in 1862 I was dependent for the animal food to supply my party of Indians entirely upon my gun; and Monos contributed not a little to the larder. The Indians eat Monkey without demur; but the meat looks dark and untempting. For my own part I far preferred the delicate Tinamou or Curassow, a sufficient supply of which never failed for my own consumption. Perhaps there is no district in Vera Paz where 'Monos' are more abundant than the mountains of Chilasco, a cold and damp region, elevated at least 6000 feet above the sea, but where the forest-growth is of the densest description and trees of the largest size abound. It was here that the specimens were obtained that are now in the British Museum. The wonderful cry whence *Mycetes* gets its trivial name of Howling Monkey is certainly most striking; and I have sometimes endeavoured to ascertain how far this cry may be heard. It has taken me an hour or more to thread the forest-undergrowth from the time the cry first struck my ear to when, guided by the cry alone, I stood under the tree where the animals were. It would certainly not be overestimating the distance to say two miles. When the sound came over the lake of Yzabal unhindered by trees, a league would be more like the distance at which the Mono's cry may be heard. These animals are found in small companies of five or six. They are usually met with in the upper branches of the highest trees, and, when disturbed, crawl sluggishly along the boughs. The young, as well as the females, are of the same dense black as the old males, but the hair is shorter and not so glossy."

9. MYCETES PALLIATUS, Gray, P. Z. S. 1848, p. 138, pl. 6; v. Frantzius, Wiegm. Arch. 1869, i. p. 254.

This *Mycetes* was originally described from examples procured by M. Sallé (as he has himself told me) in Nicaragua, where the animal is found in the islands and on the banks of the lake of Nicaragua.

Dr. v. Frantzius met with it in Costa Rica, and describes it as being there of a blacker colour than in Nicaragua. It is possible, therefore, that the Costa-Rican form may be intermediate between this species and the last.

Mr. Salvin's collector Arcé obtained specimens of this species in Costa Rica, which are now in the British Museum.

10. MIDAS GEOFFROII.

Hapale geoffroii, Puch. Rev. Zool. 1845, p. 336.

Midas geoffroii, Is. Geoffr. Cat. p. 63; Sclater, P. Z. S. 1871, p. 478, pl. 38.

I have recently recorded the receipt by the Society of a living example of this species from Colon; and since that date other specimens have been received from the same port—namely, two on the 2nd of September, and one on the 12th. The specimens of *Hapale œdipus* referred to by me (N. H. R. 1861, p. 509) as "said to have been obtained in Chiriqui," were probably of this nearly allied species.

No other member of the family Hapalidæ, so far as I know, is found so far north as Panama. In the 'Annals and Magazine of Natural History' for 1843 (vol. x. p. 398) Dr. Gray has described *Iacchus rufiventer* as coming from Mexico. This, however, is an error, as the species is Amazonian, and was obtained by Natterer * and Herndon † in the Amazonian district.

Of the two subjoined tables the first shows which of the genera of S. American Monkeys are found in Central America, and how far north they advance according to our present information. The second shows the range of the previously mentioned ten species.

TABLE I.

	Panama and Veragua.	Costa Rica.	Nicaragua.	Guatemala.	S. Mexico.
I. CEBIDÆ.					
1. Saimiris	——				
2. Nyctipithecus	——	——	——		
3. Callithrix					
4. Cebus	——	——	——		
5. Ateles	——	——	——	——	
6. Brachyteles					
7. Mycetes	——	——	——	——	
8. Pithecia					
9. Brachyurus					
II. HAPALIDÆ.					
10. Hapale					
11. Midas	——				

* See Reichenbach's 'Affen,' p. 14, where this species is described as *Midas erythrogaster*.

† *Cf.* Slack, Pr. Acad. Phil. 1861, p. 463, where this species is described as *Midas elegantulus*.

BIBLIOTECA
28 OCT 73
NACIONAL



NEW SPECIES OF SHELLS FROM
RED SEA & OTHER LOCALITIES

TABLE II.

	Panama and Veragua.	Costa Rica.	Nicaragua.	Guatemala.	S. Mexico.
1. Saimiris entomophaga	—	—			
2. Nyctipithecus lemurinus		—			
3. —— rufipes			—		
4. Cebus hypoleucus	—	—	—		
5. Ateles melanochir	—	—	—	—	—
6. —— vellerosus				—	—
7. —— ater	—				
8. Mycetes villosus				—	
9. —— palliatus		—	—		
10. Midas geoffroii	—				

2. Further Descriptions of new Species of Shells collected by Robert M'Andrew, Esq., in the Red Sea. By HENRY ADAMS, F.L.S.

[Received November 27, 1871.]

(Plate III.)

TURRICULA (COSTELLARIA) PHARAONIS, sp. nov. (Plate III. fig. 1.)

T. *testa solida, fusiformi, plicis obtusis longitudinalibus* 9–10 *et costis numerosis confertis, anterioribus validioribus, sculpta, purpureo-alba; spira turrita; anfr.* 9, *convexis, postice tabulatis, ultimo antice sensim attenuato; apertura angusta; columella* 4-*plicata, sinu siphonali brevi, vix recurvo; labro acuto, sulcato; fauce violacea.*

Long. 23, diam. 10 mill.

TURRICULA (THALA) CASTA, sp. nov. (Plate III. fig. 2.)

T. *testa tenuiuscula, elongato-fusiformi, plicis arcuatis longitudinalibus, interstitiis transverse striatis sculpta, alba; spira elongata; anfr.* 10, *vix convexis, postice subnodosis, ultimo antice subito attenuato; columella* 3-*plicata, sinu siphonali paulum producto et recurvo; labro acuto, simplici.*

Long. $8\frac{1}{2}$, diam. 3 mill.

TURRITELLA ALBA, sp. nov. (Plate III. fig. 3.)

T. *testa turrita, tenui, alba; anfr.* 12, *superne carinatis, filis confertis, quorum uno carinam formante et altero intervallo inferiore*

validioribus, cinctis; anfractu ultimo basi paulum concavo; apertura subquadrata.

Long. 14, diam. $3\frac{1}{2}$ mill.

Apparently a young shell; but I know of no species to which it can be referred.

AMPHIPERAS OVOIDEUS, sp. nov. (Plate III. fig. 4.)

A. *testa solida, ovato-globosa, dorso subangulata, striis longitudinalibus et lineis tenuissimis confertis sculpta, pallide fulvo-carnea; apertura angusta; labio antice excavato, plica obtusa mediocri ad extremitatem munito; labro varicoso, interne sulcato, albido, postice producto, canalem obliquum contortum formante, antice canalem brevem desinente.*

Long. 13, diam. 9 mill.

STOMATELLA SCITULA, sp. nov. (Plate III. fig. 5.)

S. *testa auriformi, tenui, costulis inæqualibus numerosis cincta, albida; spira prominente, sutura distincta; anfr. 4, convexis; apertura valde obliqua, subovali; columella acuta, revoluta; intus margaritacea.*

Long. 7, diam. 5, alt. $3\frac{1}{2}$ mill.

CEMORIA NANA, sp. nov. (Plate III. fig. 6.)

C. *testa solidula, elevato-conica; costis ad 15 radiantibus, anterioribus distantioribus, sculpta; apice acuto, valde adunco; apertura ovali.*

Long. 2, lat. $1\frac{1}{4}$, alt. 2 mill.

EMARGINULA RUGOSA, sp. nov. (Plate III. fig. 7.)

E. *testa solida, quadrato-elliptica, elevata, costis rugosis radiantibus et costulis excentricis distantibus clathrata, albida; apice vix centrali, acutiusculo, vix recurvo; intus albida; margine expanso, inæqualiter late crenato; incisura lata, modice profunda, intus in canalem haud ad verticem producta.*

Long. 19, lat. 13, alt. 6 mill.

EMARGINULA MODESTA, sp. nov. (Plate III. fig. 8.)

E. *testa solidula, ovali, subdepressa, pallide rufo-fulva, costis numerosis, subelevatis, radiantibus, subimbricatis (antice tribus majoribus, quorum centrali prominentiore) et lineis irregularibus concentricis sculpta; apice submediano, recurvo; margine crenulato; incisura lata, brevi, intus in canalem producta.*

Long. 7, lat. 4, alt. $2\frac{1}{2}$ mill.

CADULUS MINUTUS, sp. nov. (Plate III. fig. 9.)

C. *testa lævi, tenui, arcuata, antice paulum contracta, albida; apertura circulari, vix obliqua.*

Long. 4, diam. $\frac{3}{4}$ mill.

CYLICHNA MINUTA, sp. nov. (Plate III. fig. 10.)

C. *testa cylindracea, tenui, lævigata, subpellucida; apertura lineari, antice dilatata; columella brevi, simplici; labro postice paulum producto, margine arcuato.*

Long. 1½, lat. ½ mill.

PHYLINE ERYTHRÆA, sp. nov. (Plate III. fig. 11; fig. 11 *a*, gizzard.)

P. *testa subquadrato-ovali, tenui, semipellucida, lineis transversis distantibus insculpta; apertura ampla, antice dilatata; margine columellari tenui; labro postice rotundato, margine arcuato.*

Long. 8, lat. 6 mill.

The gizzard of this species has the plates deeply serrated on the edges.

TORNATINA INCONSPICUA, sp. nov. (Plate III. fig. 12.)

T. *testa elongato-ovoidea, solidiuscula, antice transversim tenuissime striata, albida; spira paulum exserta; apertura angusta, in medio coarctata, antice dilatata; columella plica minuta instructa; labro margine arcuato.*

Long. 3, lat. 1½ mill.

ATYS (ALICULA) ISSELI, sp. nov. (Plate III. fig. 13.)

A. *testa subcylindracea, tenui, minutissime spiraliter striata, striis antice validioribus et distantioribus, albida, strigis subpellucidis sinuatis ornata; anfractu ultimo antice rotundato, subattenuato; apertura angusta; columella brevi, callosa; labro recto, arcuato, postice paulum producto.*

Long. 6, lat. 3 mill.

RINGICULA MINUTA, sp. nov. (Plate III. fig. 14.)

R. *testa solida, acuminato-ovata, sulcis transversis distantibus sculpta, alba; spira acuminata; anfr.* 4, *convexiusculis, ultimo amplo; apertura auriculata; labio modice calloso, plicis duabus munito; dente parietali conspicuo, tenui; labro incrassato, intus* 1-*denticulato.*

Long. 1½, diam. ¾ mill.

SCAPHARCA PYGMÆA, sp. nov. (Plate III. fig. 15.)

S. *testa transversa, ovali, ventricosa, costis radiantibus* 24 *utrinque majoribus, et lineis distantibus concentricis cancellata, alba, epidermide tenui fusca induta; lateribus rotundatis, superne angulatis; margine ventrali arcuato; umbonibus submedianis, in medio obscure radiatim sulcatis; area cardinali mediocri.*

Long. 12, alt. 7, lat. 6 mill.

ANOMALOCARDIA TRANSVERSALIS, sp. nov. (Plate III. fig. 16.)

A. *testa transversa, valde inæquilaterali, subrhomboidali, costulis numerosis radiantibus, subsquamosis, posticis majoribus, sculpta, alba; extremitate antica arcuata, cum margine dorsali angulum*

rectum formante; extremitate postica lata, superne obliqua, recta, cum margine dorsali angulum obtusum formante; umbonibus antemedianis, obtusis, paulum elevatis; area cardinali angusta.

Long. 14, alt. 9, lat. 5 mill.

3. Descriptions of fourteen new Species of Land and Marine Shells. By HENRY ADAMS, F.L.S.

[Received November 27, 1871.]

(Plate III.)

LEPTOCONUS (PHASMOCONUS) DU SAVELI, sp. nov. (Plate III. fig. 17.)

L. *testa convexo-conica, polita, solidiuscula, antice distanter punctolirata, roseo-lutea, fasciis tribus ex striis longitudinalibus et maculis rufis formatis ornata, seriebus numerosis macularum candidarum purpureo-lividarum alternantium cincta; spira acuminata, conica, apice mucronato; sutura distincta, sursum subcanaliculata, longitudinaliter rufo-striata; anfr.* 10½, *superne angulatis, ad apicem nodulosis, anfractu ultimo paulum ventricoso; apertura mediocri, antice subdilatata; labro acuto, postice sinuato.*

Long. 50, lat. 20 mill.

Hab. Mauritius (*coll. Du Savel*).

This beautiful species, at present unique, is stated to have been obtained from the stomach of a fish, but is in a good state of preservation. It appears to belong to the group *Phasmoconus*, Mörch, as regards the surface, texture, and style of painting, but has, nevertheless, somewhat the aspect of the genus *Nubecula*.

STYLODONTA (EREPTA) BEWSHERI, sp. nov. (Plate III. fig. 18)

S. *testa imperforata, depresso-conica, solidula, plicis acutis, obliquis, undulatis munita, pallide rufo-fulva; spira breviter elevata, apice obtuso, sutura marginata, valde impressa; anfr.* 6, *convexis, lente accrescentibus, ultimo non descendente, ad peripheriam acute carinato, carina compressa, serrata, subtus convexo, medio excavato; apertura obliqua, angulato-lunari; perist. simplici, marginibus remotis, dextro sinuato, obtuso, basali arcuato, calloso.*

Diam. maj. 14, min. 13, alt. 18 mill.

Hab. Basin du Diable, near St. Denis, Isle of Bourbon (*coll. Caldwell*).

I have named this species after Mr. E. C. Bewsher of Port Louis, Mauritius, who discovered it in the locality above mentioned, which is elevated 1000 feet above the level of the sea. It is closely allied to *S. semicerina*, Morel., but differs in being imperforate, in the plication of the surface being stronger and more acute (thus causing the keel, which is very compressed, to be serrated), by the whorls being more convex, and by its uniform light reddish-brown colour.

Cylindrella (Holospira) gealei, sp. nov. (Plate III. fig. 19.)

C. *testa minute perforata, cylindracea, solida, oblique striata, albida; spira oblonga, apice conico, acutiusculo, flavido; anfr.* 12–13, *planiusculis, superne subangulatis, ultimo paulum ascendente, antrorsum breviter soluto; apertura angulato-circulari; perist. continuo, undique expanso et reflexiusculo.*

Long. 15, diam. $5\frac{1}{2}$ mill.

Hab. Putla, Oaxaca, Mexico (*coll. H. Ad.*).

Cylindrella (Urocoptis) decurtata, sp. nov. (Plate III. fig. 20.)

C. *testa arcuato-rimata, subcylindracea, truncata, tenuiuscula, leviter oblique plicata, pallide rufo-fulva; sutura impressa; anfr. superst.* 6–7, *subplanulatis, superne paulum angulatis, ultimo antice breviter soluto, non descendente, dorso et basi levissime filocarinato; apertura parum obliqua, subcirculari; perist. breviter expanso et reflexiusculo, albido.*

Long. 28–29, diam. 10 mill.; ap. diam. 6 mill.

Hab. Putla, Oaxaca, Mexico (*coll. H. Ad.*).

Pupinopsis morrisonia, sp. nov. (Plate III. fig. 21.)

P. *testa rimata, pupæformi, solida, oblique capillaceo-striata, pallide fulva; spira oblongo-conica, apice acutiusculo, sutura impressa; anfr.* $7\frac{1}{2}$, *convexiusculis, ultimo basi juxta rimam cristato; apertura verticali, circulari, bicanaliculata; perist. duplici, interno obtuso, porrecto, sinum superiorem circumveniente, externo expanso, reflexo, superne cum interno conjuncto, canalem basalem callo circumvallente.*

Long. 12, diam. 5 mill.

Hab. Mount Morrison, Formosa (*Mr. Swinhoe*).

Diplommatina concinna, sp. nov. (Plate III. fig. 22.)

D. *testa dextrorsa, non rimata, ovato-fusiformi, tenui, costulis tenuibus distantibus sculpta, pallide cornea; spira subconica, apice obtuso, sutura impressa; anfr.* 6, *convexis, antepenultimo paulum tumidiore, ultimo ascendente; apertura subverticali, rotundo-lunari, plica columellari valida, conspicua; perist. duplici, interno vix elevato, externo expanso, subreflexo, angulo subtus producto, margine columellari sinuato, angulo subtus desinente; callo parietali tenui, mediocriter expanso.*

Long. 3, diam. $1\frac{1}{2}$ mill.

Hab. Borneo (*coll. H. Ad.*).

Raeta grayi, sp. nov. (Plate III. fig. 23.)

R. *testa tenui, fragili, ovato-trigonali, ventricosa, postice hiante, concentrice plicata, candida; umbonibus submedianis; latere antico rotundato; latere postico angustato, compresso, subtruncato; margine dorsali antice arcuato, postice subrecto.*

Long. 35, alt. 28, lat. 20 mill.

Hab. Borneo (*coll. H. Ad.*).

SCAPHULA BENSONI, sp. nov. (Plate III. fig. 24.)

S. *testa tenuiuscula, rhomboidali, striis rugosis concentricis sculpta, sub epidermide olivaceo-fusca albida; umbonibus subterminalibus; extremitate antica brevi, acuminata; extremitate postica subtruncata; margine dorsali recto; margine ventrali sinuato, dorsali fere parallelo; fastigio umbonali valde elevato, acuto; intus cærulescente.*

Long. 10, alt. 3, lat. 5 mill.

Hab. ——? (*coll. H. Ad.*).

This is the fourth species of the genus known. The others are from India; but the exact locality from which this was obtained I was unable to ascertain.

CLATHURELLA RUBRO-GUTTATA, sp. nov. (Plate III. fig. 25.)

C. *testa fusiformi, tenui, plicis longitudinalibus ad* 12 *et liris transversis eminentibus clathrata, nivea, seriebus duabus macularum sanguinearum ornata; spira acuta, sutura distincta; anfr.* 8, *convexis; apertura anguste lunata,* $\frac{3}{8}$ *totius longitudinis; columella flexuosa; labro tenui, intus lævi, margine dentato, sinu minime profundo; canali brevi, lato.*

Long. 8, diam. $3\frac{1}{2}$ mill.

Hab. New Hebrides (*coll. Hargraves*).

CLATHURELLA PULCHERRIMA, sp. nov. (Plate III. fig. 26.)

C. *testa ovato-fusiformi, solida, plicis obtusis confertis, et costis validis tribus, elevatis, transversis, intervallis filo-costatis, clathrata, alba; spira breviter turrita, apice subplano, sutura profunda; anfr.* 4, *convexis, ultimo subventricoso; apertura acuminato-ovali, dimidium totius longitudinis; columella flexuosa; labro vix expanso, paulum incrassato, crenulato, intus lævi, sinu lato, brevissimo; canali angusto, producto, recurvo.*

Long. 7, diam. 4 mill.

Hab. New Hebrides (*coll. Hargraves*).

ZAFRA PUPOIDEA, sp. nov. (Plate III. fig. 27.)

Z. *testa elongato-ovoidea, solida, plicis numerosis, obtusis, validis, longitudinalibus sculpta, albida, infra peripheriam fascia fusca ornata, ad basin fusco tincta; spira convexo-conica, sutura impressa; anfr.* 6, *planiusculis, ultimo attenuato; apertura angusto-ovali; columella arcuata, callosa; labro subacuto, sinu lato, brevi.*

Long. 7, diam. 3 mill.

Hab. New Hebrides (*coll. Hargraves*).

The genus *Zafra*, formed by my brother to receive the small shells of which this is an additional species, has been subsequently named *Seminella* by Mr. Pease. It belongs to the family *Turridæ*.

NASSA EXIMIA, sp. nov. (Plate III. fig. 28.)

N. *testa ovato-conica, tenui, nitida, costulis confertis ubique cancellata, flavida, fasciis tribus pallide fulvis ornata; spira conica,*

sutura profunda; anfr. 6, *convexis, apicalibus lævibus; columella arcuata, callosa, postice callo erecto instructa; apertura subovali; labro intus sulcato, extus valde incrassato; fauce fulva.*

Long. 8, diam. 4 mill.

Hab. New Hebrides (*coll. Hargraves*).

EULIMA PORCELLANA, sp. nov. (Plate III. fig. 29.)

E. *testa subulata, solida, politissima, eburnea; spira acuminata, sursum subattenuata, sutura leviter impressa; anfr.* 12, *subplanatis, ultimo basi rotundato; apertura acuminato-ovali; columella arcuata, collosa; labro sinuato.*

Long. 14, diam. 4 mill.

Hab. New Hebrides (*coll. Hargraves*).

OXYNOË HARGRAVESI, sp. nov. (Plate III. fig. 30.)

O. *testa tenuissima, subpellucida, ovoidea, postice producta, involuta, alba, strigis opacibus longitudinalibus, lineis incrementi sequentibus ornata; apertura ampla, antice rotundata, postice angustata; labio tenui, vix reflexo; labro acuto, superne inflexo.*

Long. 7, diam. $4\frac{1}{2}$ mill.

Hab. New Hebrides (*coll. Hargraves*).

DESCRIPTION OF PLATE III.

Fig. 1. *Turricula* (*Costellaria*) *pharaonis*, p. 9.
2. —— (*Thala*) *casta*, p. 9.
3. *Turritella alba*, p. 9.
4. *Amphiperas ovoideus*, p. 10.
5. *Stomatella scitula*, p. 10.
6. *Cemoria nana*, p. 10.
7. *Emarginula rugosa*, p. 10.
8. —— *modesta*, p. 10.
9. *Cadulus minutus*, p. 10.
10. *Cylichna minuta*, p. 11.
11. *Phyline erythræa*; fig. 11 *a*, gizzard: p. 11.
12. *Tornatina inconspicua*, p. 11.
13. *Atys* (*Alicula*) *isseli*, p. 11.
14. *Ringicula minuta*, p. 11.
15. *Scapharca pygmæa*, p. 11.
16. *Anomalocardia transversalis*, p. 11.
17. *Leptoconus* (*Phasmoconus*) *du saveli*, p. 12.
18. *Stylodonta* (*Erepta*) *bewsheri*, p. 12.
19. *Cylindrella* (*Holospira*) *gealei*, p. 13.
20. —— (*Urocoptis*) *decurtata*, p. 13.
21. *Pupinopsis morrisonia*, p. 13.
22. *Diplommatina concinna*, p. 13.
23. *Raeta grayi*, p. 13.
24. *Scaphula bensoni*, p. 14.
25. *Clathurella rubro-guttata*, p. 14.
26. —— *pulcherrima*, p. 14.
27. *Zafra pupoidea*, p. 14.
28. *Nassa eximia*, p. 14.
29. *Eulima porcellana*, p. 15.
30. *Oxynoë hargravesi*, p. 15.

4. On the Œsophagus of the Pied Hornbill (*Toccus melanoleucus*): being an Appendix to a paper on the Taxonomic Character of the Muscular Sheath of that Tube as regards Sauropsida*. By George Gulliver, F.R.S.

[Received December 2, 1871.]

Through the courtesy of Mr. Sclater I have had an opportunity of examining the viscera of the Pied Hornbill (*Toccus melanoleucus*) that died in the Society's Menagerie on the 23rd of November, 1871. It was a male bird; and the cause of its death was tubercular peritonitis—that scourge of the Vertebrates in the Society's Gardens.

In the memoir cited above it was shown that Birds and Reptiles may, by the single character of the want of a sheath of transversely striated muscular fibre on the œsophagus, be sharply defined from Mammals and Fishes, in which last two classes more or less of the length of the œsophageal sheath is, on the contrary, regularly composed of muscular fibre that is transversely striated.

But it remains for inquiry whether exceptions may not be found to this rule. And these, were we to judge from function of structure, might be confidently expected in Birds; for in this class we find numberless instances of a voluntary and habitual regurgitation or ejection of matters from the upper part of the alimentary canal. And yet in none of these cases has the œsophagus or stomach been found with an investment of that striated fibre which belongs to the voluntary muscles of the skeleton of the species. If, therefore, either of these parts of the alimentary canal be the active agent in such regurgitation or ejection, the voluntary muscles of that part must be of the smooth kind, as, indeed, they are well known to be throughout the frame in several classes of Invertebrates.

Among Mammals, the Ruminants have been proved to possess an œsophageal sheath of striated muscle, as was expected in these animals; and it has accordingly been described as if characteristic of this order. Thus the Ruminants are the only Mammals in which this kind of muscular fibre has been noticed by the author of the 'Comparative Anatomy of Vertebrates' as belonging to the œsophageal sheath. "The œsophagus is frequently concerned in regurgitation; and in the Birds in which this phenomenon occurs the muscular coat of the gullet, like that in Ruminants, is well developed" (vol. ii. p. 158). "In true or ordinary Ruminants the muscular fibres of the œsophagus are disposed in two layers of spirals, taking reverse directions, which decussate at one or other of two opposite longitudinal lines; the outer layer contains more muscular and less cellular tissue than the inner one; the fibres of both are of the striated kind; and, as is usual when such are in more habitual and energetic action, they are of a redder colour than in non-ruminating Mammals" (vol. iii. p. 470).

* See P. Z. S. 1870. p. 283.

Hence it seems interesting to examine the œsophagus of the birds alluded to above; and I have in former memoirs shown that the Owls and Hawks, like other birds, are devoid of an œsophageal sheath of transversely striated muscular fibre. But the remarkable power possessed by the Hornbills, of ejecting matters through the œsophagus upwards, suggests the necessity of extending the examination to these birds especially. And this I have done, so far as regards the species mentioned at the head of this paper.

The sheath of the œsophagus was thin, of a reddish colour, and composed of fibres almost if not completely arranged transversely, as is usual in birds. These fibres appeared in bands or fascicles, each about $\frac{1}{250}$th of an inch thick, and made up of smooth fibrils closely connected together, each about $\frac{1}{4000}$th of an inch in diameter, and the whole of them so thickly studded with nuclei as to make the fibres appear speckled when examined under an achromatic object-glass of one tenth of an inch focal length. Not even a single transversely striated fibre or fibril could be found on the œsophagus lower than the termination of the pharyngeal muscles.

In short, there was no transversely striated muscular fibre on the true œsophagus; and thus this bird affords no exception to the rule of a want of this kind of muscle on the œsophagus of the class. And hence, so far as is at present known, Mammals and Fishes might be truly defined as Vertebrates with transversely striated muscular fibre on the œsophagus, and Birds and Reptiles as Vertebrates devoid of a transversely striated œsophageal muscular sheath. How the differences in the extent of this fibre along the œsophagus afford good taxonomic characters in the Mammalian class has been explained in my papers published in the 'Proceedings' of the Zoological Society, June 14, 1842, April 22, 1869, and May 12, 1870.

The colour of the muscles of animals is often, but by no means always, correlated with their energetic action. Neither is the colour regularly indicative of the intensity of the transverse markings in animals generally, nor is it redder in the œsophagus of Ruminants particularly than in many other Mammals. In Insects of the most active habits, and in numerous energetic Fishes and Lizards, the muscles are pale, and yet more forcibly marked with transverse stripes than the deeply coloured muscles of many Birds and Mammals, as is well known of the Skate and Man to teachers of histology. Leydig, indeed, maintains that this distinctness or largeness of the striæ is related to the activity of the muscles, and adduces Insects as exemplifications of his opinion. But the muscles of many sluggish Caterpillars and of some other equally tardy Arthropoda are quite as plainly striated. In several birds, as the common Swift (*Cypselus apus*), the transverse striæ of the fibres of the wonderfully active pectoral muscles are much less distinct than in the comparatively idle muscles of the legs (Proc. Zool. Soc. June 14, 1842). Though in Ruminants the transversely striated muscle of the œsophageal sheath extends to the stomach, there is a large proportion of smooth muscular fibre on the last inch or two of the œsophagus. And in many other Mammalia, as, *e. g.*, certain Bears and Rodents, the

œsophageal muscular sheath is quite as red and comparatively as thick as in Ruminantia, and even more completely composed throughout its length to its cardiac end of transversely striated muscular fibre than in this order.

5. Descriptions of new Land-Shells from Australia and the South-Sea Islands. By James C. Cox, M.D., of Sydney, New South Wales.

[Received December 4, 1871.]

(Plate IV.)

1. Helix (Helicostyla) croftoni, sp. nov. (Plate IV. fig. 1.)

Shell imperforate, rather solid, conoid-globose, obliquely transversely striated, yellow, ornamented with dark chestnut or blackish zones and lines of various widths, one, in particular, always beneath the suture, and another at the base round the umbilical region, the intervening space between these two lines being more or less occupied with narrow lines; spire raised, conoidly rounded, suture impressed, margined with a white thread; whorls 7, convex, last whorl descending in front; aperture lunar-oval, pale violet within; peristome straight, whitish, expanded and moderately reflexed throughout, margins joined by a rather thick glossy callus; columella solid, slightly curved, dilated and impressed, strongly adherent to the body-whorl, occluding the umbilicus.

Diam., greatest 1·65, least 1·34; height 1·60 inch.

Hab. Hydrometer River, west of Port MacKay, Queensland, Australia; found inside the hollow trunks of quangdong trees.

This species appears to be very local in habitat; its characters participate in those of *Helix blomfieldi*, Cox, and *Helix coxi*, Crosse.

2. Helix (Hadra) parsoni, sp. nov. (Plate IV. fig. 2.)

Shell with a large deep open umbilicus, transversely finely striated, globosely conical, dark purple-black, much lighter towards the apex, where it is indistinctly ornamented with fine spiral lines; spire raised, obtusely conical, suture distinctly margined with a narrow white line; whorls $7\frac{1}{2}$, convex, gradually increasing in size, last produced and deflected in front, base flattened; aperture diagonal, ovately lunar, livid within; peristome of a purplish white colour, very slightly thickened, expanded and reflexed throughout; margins approximating, joined by a thin glossy callus, columellar margin triangularly dilated, overhanging the large umbilicus.

Diam., greatest 1·42, least 1·09; height 1·53 inch.

Hab. Gayndah, Queensland, Australia.

This species, in general aspect, is very like some of the smaller

specimens of *H. blomfieldi*, Cox, but it may at once be distinguished from that species by its flat base and its large open umbilicus, overhung by the expanded columellar margin.

3. Helix (Trachia) dryanderensis, sp. nov.

Shell flatly depressed, smooth, thin, with a very large, broad, open, shallow umbilicus, in which the sutures of the spire are distinctly seen, light brown throughout; whorls $4\frac{1}{2}$, extremely rounded, gradually increasing in size, the last much deflected in front, base rounded; spire almost flat, suture large and deep; aperture circular, dilated, slightly constricted behind; margins almost meeting, columellar margin simple, straight.

Diam., greatest 0·42, least 0·34; height 0·15 of an inch.

Hab. Mount Dryander, Port Denison, Queensland, Australia.

This species is allied to *Helix cyclostomata*, Le Guillou, but it partakes even more of the form of a *Cyclostoma* than that species.

4. Bulimus (Placostylus) cuniculinsulæ, sp. nov. (Plate IV. fig. 3.)

Shell largely rimate, pyramidally ovate, thin, translucent, covered with a tough chestnut-coloured epidermis, obliquely, roughly, irregularly striated longitudinally; spire conical, lighter at the apex and denuded of epidermis; whorls 6, convex, the last inflated, rounded at the base, equalling three fifths the length of the shell; aperture irregularly ovate; peristome straight, slightly thickened and somewhat everted, tinted with pink internally; columella pyramidally dilated, of a pink colour, moderately arched; margins of the peristome joined by a thin pink callus.

Length 1·65, breadth 0·75 of an inch.

Hab. Rabbit Island, near Lord Howe's Island, Pacific Ocean.

This species has recently been found abundantly on Rabbit Island; it is closely allied to its neighbour *Bulimus bivaricosus*, Gask., of Lord Howe's Island; it is a smaller and a lighter shell, and is invariably decidedly rimate.

5. Bulimus (Charis) kreftii, sp. nov. (Plate IV. fig. 4.)

Shell scarcely rimate, elongately ovate, not thin, longitudinally finely striated, shining, covered with a light reddish-brown epidermis; apex yellow-red, suture deep-margined below with a white line; whorls 6, convex, the last occupying two thirds the length of the shell; aperture large, elongately oval, white within; peristome straight, thickened and everted at the edge; columella white, broadly conical, dividing into two pillars, one running on to the body-whorl and blending with the thin callus which joins the margins of the peristome, the second (which is flattened and projecting) running spirally within the body-whorl.

Length 2·10, breadth 0·92 of an inch.

Hab. Solomon Islands.

I have several specimens of this shell in my collection, which I am unable to refer to any of the previously described species.

6. HELIX (GEOTROCHUS) LEUCOPHÆA, sp. nov. (Plate IV. fig. 5.)

Shell with a covered umbilicus, turbinately globose, transversely very finely striated, and, at the base more particularly, finely longitudinally striated; usually very light brown, ornamented with grey zones and bands; whorls $5\frac{1}{2}$ to 6, gradually increasing, rounded, last very slightly reflected in front, subangled at the periphery, flattened at the base; suture impressed; aperture lunar-oval; peristome white, flatly expanded and reflected; margins approximating, columellar margin dilated and reflexed, concealing the umbilicus.

Diam., greatest 0·80, least 0·62; height 0·80 of an inch.

Hab. Gaudalcanar, San Christoval, and other islands of the Solomon group.

I have possessed specimens of this shell for several years; and it was considered, by good authorities to whom I referred it, to be *Helix migratoria*; I took for granted that it was such, and have frequently distributed it under that name. Having since looked into the characters of *Helix migratoria*, as given by Pfeiffer in the Proc. Zool. Soc. 1855, p. 108, and at the figure of the same (pl. xxxii. fig. 3), I find that they do not correspond with the characters of the shell now described, which I therefore consider to be a new species; it varies much in its markings, being sometimes uniformly of a grey colour without bands, and again uniformly of a light brown colour, with no grey zones or bands.

6. Descriptions of seven new Species of Land and Marine Shells from the Solomon Islands, Western Polynesia, and Australia. By JOHN BRAZIER, C.M.Z.S.

[Received December 4, 1871.]

(Plate IV.)

[Specimens of the species marked with an asterisk are deposited in the British Museum.]

*1. HELIX (GEOTROCHUS) BRODIEI, sp. nov. (Plate IV. fig. 6.)

Shell imperforate, flatly conical, thin, shining, obliquely faintly and irregularly plicately striated, white, with a chalk-white band at the suture and periphery, and with a spiral band of dark brown at the base, sometimes diffused; with the white band at the periphery; keeled, rather blunt at the apex; whorls 5, nearly flat, the last convex at the base; aperture oblique, rhomboidally ovate; peristome dark brown, moderately thickened, margins approximating, the right slightly deflexed, the columellar margin reflected and furnished with a straight callus.

Diam. maj. 8, min. $6\frac{1}{2}$, alt. 7 lin.

Hab. Choiseul Island, Solomon Islands.



BRITISH
MUSEUM
2300c73

This fine species I have named after its discoverer Capt. Brodie, an enthusiastic collector, who has contributed much to our knowledge of the Solomon Islands.

Varieties of this species occur in which the dark-brown band is occasionally found above the chalk-white one, and a brown band under the periphery.

*2. HELIX (GEOTROCHUS) CHOISEULENSIS, sp. nov. (Plate IV. fig. 7.)

Shell perforate, conical, moderately solid, obliquely very finely striated, reddish brown, ornamented with a yellow sutural band, and two others below; spire conical, apex acute; whorls 6, moderately convex, the last not descending, slightly angled at the periphery, convex at the base; aperture diagonal; peristome rose-coloured, rather widely expanded and reflected; collumellar margin dilated and reflexed, almost covering the perforation.

Diam. maj. 8, min. 6, alt. 8 lin.

Hab. Choiseul Island, Solomon Islands (*Captain Brodie*).

This pretty species is intermediate in form between *Helix splendescens*, Cox, and *Helix mendana*, Angas, also from the Solomon Islands.

*3. HELIX (GEOTROCHUS) MENDOZA, sp. nov. (Plate IV. fig. 8.)

Shell narrowly perforate, conical, rather thin, very finely obliquely striated, light straw-colour throughout; spire conoid, apex rather obtuse; whorls 6 to $6\frac{1}{2}$, slightly convex, narrowly channelled at the suture, sharply carinated and angled at the periphery, base rather flat; aperture oblique, triangularly ovate; peristome thin, white, right margin a little expanded, columellar margin reflexed, and expanded over the perforation.

Diam. maj. $6\frac{1}{2}$, min. $5\frac{1}{2}$, alt. 8 lin.

Hab. Choiseul Island, Solomon Islands (*Captain Brodie*).

This species differs from any of the known *Geotrochi* from the Solomon Islands in being sharply carinated at the periphery.

4. HELIX (CAMÆNA) MULGRAVENSIS, sp. nov.

Shell umbilicated, turbinately globose, thin, smooth, very faintly obliquely striated with fine granulations (only seen under the lens), reddish yellow, with numerous spiral chestnut lines and bands; spire conoid, obtuse; whorls 6, convex, last deflected in front, base sculptured the same as the upper surface; umbilicus deep; aperture diagonal, lunate, interior purplish; peristome reflected, tinged with brown, margins approximating and joined by a thin callus, columellar margin dilated and reflected, nearly covering the umbilicus.

Diam. maj. 2 inches 4 lin., min. 1 inch 2 lin., alt. 1 inch 1 lin.

Hab. Mulgrave Island, Torres Strait, North Australia (*coll. Brazier* and *Hargraves*).

This species is distinguished by the numerous fine reddish lines

encircling the whole of the shell, more numerous on the base, and by the pink and brown peristome.

*5. Triton (Epidromus) coxi, sp. nov. (Plate IV. fig. 9.)

Shell turrite, thin, with six rather indistinct rounded varices; spire slightly twisted, apex obtuse; whorls 6, sculptured with irregular, very close-set, longitudinal ribs, slightly noduled at the suture, rounded, and articulated with fine impressed striæ, very light brown, darker on the varices, the whorls furnished with three transverse lines in the form of dots somewhat like a chain, the last or body-whorl with a dark-brown blotch, and finely marked with dots of the same colour; columella arcuate, smooth; lip white, thickened; canal very short, recurved; outer lip white, finely denticulated within.

Alt. 1 inch, breadth $2\frac{1}{4}$ lines.

Hab. Bellengen River, New South Wales (*Brazier*).

This pretty species I have named after Dr. James Cox of Sydney. It is the second species of the subgenus *Epidromus* that has been found on the coast of New South Wales; it is a very light shell, while the *Epidromus brazieri*, Angas, is a thick and heavy shell. I obtained a few broken specimens of it also at the Bellengen river.

6. Tritonidea petterdi, sp. nov.

Shell fusiform, thick, longitudinally flatly ribbed and transversely ridged, the interstices filled with rows of muricated scales (only seen under the lens), whitish, ornamented with a pure white band in the centre of the whorls, and a faint brown one below; spire moderately elevated, apex blunt; whorls 6, almost flat, suture impressed; aperture ovate; canal short, slightly recurved; columella arched; outer lip crenulated, thickened externally, strongly denticulated within.

Alt. $5\frac{1}{2}$, breadth 2 lines.

Hab. North-east coast of Tasmania (*W. F. Petterd*).

I have only seen one specimen of this species, which is in the cabinet of Mr. Petterd.

7. Humphreyia coxi. (Plate IV. figs. 10, 10*a*.)

Shell with the valves large, broadly ovately rounded, horny white, irregularly roughly striated; tube straight, smooth, opaque-white, short and round; disk globularly inflated, wrinkled, rather sparingly covered with short, straight, small tubes and a few perforations.

Length of valves 0·46, breadth 0·32; height of inflated disk 1·00, breadth 0·80; length of tube from edge of disk 1·05 inch.

Hab. Near Port Stephens, east coast of New South Wales.

The general shape of this interesting shell reminds one of a short club. It differs from the only other species of the same genus, *Humphreyia strangei*, in the very large ovately rounded shell, in the straight tube, and in the inflated disk; the tube partakes of the character of the genus *Humphreyia*, and the inflated disk of that of

Aspergillum. The type specimen is in the cabinet of Dr. James C. Cox of Sydney.

DESCRIPTION OF PLATE IV.

Fig. 1. *Helix* (*Helicostyla*) *croftoni*, p. 18.
2. —— (*Hadra*) *parsoni*, p. 18.
3. *Bulimus* (*Placostylus*) *cuniculinsulæ*, p. 19.
4. —— (*Charis*) *kreftii*, p. 19.
5. *Helix* (*Geotrochus*) *leucophæa*, p. 20.
6. —— (——) *brodei*, p. 20.
7. —— (——) *choiseulensis*, p. 21.
8. —— (——) *mendoza*, p. 21.
9. *Triton* (*Epidromus*) *coxi*, p. 22.
10. *Humphreyia coxi*, p. 22.

In a second communication from Mr. Brazier, the following additional habitats of certain species of *Volutidæ* were given :—

Scapha mamilla, Gray, hitherto regarded as only from Tasmania, has been found near Lake Macquarie, New South Wales.

Scaphella marmorata, Swainson, ranges from Outer Manly Beach, near the north head of Port Jackson, northwards as far as the Clarence river.

Scapha deshayesii, Reeve, is not from the Solomon Islands, as given by Dr. Gray in his British-Museum Catalogue, but from the east coast of New Caledonia, at Uagap, and north of Balade.

Scapha punctata, Swainson, is found at intervals all along the east coast of New South Wales, from Broken Bay northwards as far as the Bellengen and Clarence rivers.

January 16, 1872.

Prof. Newton, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of December, 1871 :—

The total number of registered additions to the Society's Menagerie during the month of December was 64, of which 6 were by birth, 29 by presentation, 17 by purchase, 4 received in exchange, and 8 received on deposit. The total number of departures during the same period by death and removals was 94.

Amongst the additions three only are of sufficient interest to call for special remarks. These are :—

1. A Cuvier's Toucan (*Ramphastos cuvieri*), purchased Dec. 14th, being the first example of this fine species received alive by the Society.

2. A Grey-winged Blackbird (*Turdus pœcilopterus*, Vigors), brought from Cashmere, and presented to the Society by Mrs. W. A. Ross, Dec. 21st, being, as I believe, the only example of this excellent songster brought to Europe, except one previously received by the Society in 1859*.

3. A young female Prince-Alfred's Deer, born in the Gardens Dec. 27th, having been bred between the male presented by the Duke of Edinburgh May 5th, 1870†, and the female obtained in exchange April 1st, 1871‡. The female was placed with the male on her arrival, and copulation took place very soon afterwards. The fawn resembles its mother, as regards marking, in every particular, and at present shows every symptom of health and strength.

The acquisition of both sexes of a *Cervus* previously unknown to science, and its propagation in our Gardens, must be regarded as occurrences of special interest.

I may add that, since the return of the Duke of Edinburgh to this country, I have ascertained that the male *Cervus alfredi* (of the history of which we were previously unacquainted) was presented to His Royal Highness by a Spanish gentleman at Manilla; so that the supposed habitat of this species (indicated P. Z. S. 1871, p. 478) is confirmed.

The following letter was read from Prof. Owen, addressed to the Secretary:—

"British Museum, 6th January, 1872.

"My dear Sir,—In a letter from my esteemed correspondent, Dr. Julius Haast, F.R.S. &c., dated 'Christchurch, New Zealand, October 27th, 1871,' he informs me that '*Aptornis* has been found in the Glenmark swamp; the Canterbury Museum possesses a femur identical with that figured by you.' '*Cnemiornis* does not occur in the swamp' (at Glenmark) 'except very rarely, but is very frequent in the stratified, postpliocene, peaty, alluvial beds below it, exposed in the banks of a small creek.

"'I have no doubt that, on some of the large islands at the south-western parts of this island, the *Notornis* is still comparatively abundant; but it is so very difficult to get there. It has always been my wish to go there for a month or so, if I could only manage to be landed by one of the steamers.'

"It is, of course, gratifying to me to receive this confirmation of the two generic types of large extinct Ralline birds in New Zealand, as it must be to you to have this acknowledgment of the aid given by the plates published in the Society's 'Transactions' in advancing our knowledge of those rare species.

"Believe me, truly yours,

"Richard Owen."

"*P. L. Sclater, Esq., F.R.S.,*
"*Sec. Zool. Soc. Lond.*"

* See Cat. of Vert. 1st ed. p. 50.
† See P. Z. S. 1870, p. 381.
‡ See P. Z. S. 1871, p. 478.

Mr. H. E. Dresser, F.Z.S., exhibited some skins and eggs of various species of *Reguloides* and *Phylloscopus*, and made the following remarks:—

"On the 7th of Feb. last, I had the honour to exhibit before this Society some eggs, which I then had good reason to believe were those of *Reguloides superciliosus*; but since then I have ascertained that such was not the case. I have now the pleasure of bringing to your notice the true eggs of the last-named bird, collected by the well-known Indian naturalist, Mr. W. E. Brooks of Etawah. This gentleman undertook, at considerable expense, a journey to Cashmere in May last, chiefly for the purpose of finding out the breeding-haunts of this species, and was fortunate enough to procure a splendid series of eggs, obtaining likewise, in almost every instance, the old bird along with the eggs.

"I will not enter into full details of the nidification of this species (although I have received very full particulars from Mr. Brooks), as I understand from him that he has sent a paper to the Editor of 'The Ibis' on the subject, but will merely state that the Dalmatian *Regulus* places its nest on the ground, most generally on a bank-side, whereas its near ally, *Reguloides proregulus*, the eggs of which were procured by Mr. Brooks's friend, Capt. Cock, places its nest, like the Gold Crest (*Regulus cristatus*), high up in a fir tree. The nest of *Reguloides superciliosus* is dome-shaped, built of grass, and sometimes lined with hair, the entrance being at the side.

"I have also much pleasure in exhibiting an egg of *Reguloides occipitalis*, procured by Mr. Brooks at the same time as the above-mentioned eggs of *R. superciliosus*. Mr. Brooks wrote to me some time ago, suggesting that the white eggs which I exhibited as those of *R. superciliosus* might possibly be those of *R. occipitalis*; and it is probable that he is correct in his surmise, as will be seen by comparing the egg of this species procured by Mr. Brooks with (as it now appears) the spurious eggs I exhibited on the 7th of Feb. last. The twenty-four eggs of *Reguloides superciliosus* and the one egg of *R. occipitalis* were all taken by Mr. Brooks himself at Gulmurg, Cashmere, between the 31st of May and 7th of June last.

"The former, as will be seen from the specimens now exhibited, are white, more or less spotted with red, and in some instances purplish brown, and in character are intermediate between the eggs of our common Willow-Wren and the Chiffchaff. The egg of *Reguloides occipitalis* is of a pure white.

"I may also take the present opportunity of exhibiting a new European Chiffchaff, described by Mr. E. F. von Homeyer at the meeting of the German ornithologists, held in May last at Görlitz, under the name of *Phyllopneuste brehmi*. It is only fair to Mr. Brooks to state that he wrote to me early in March last to say that he had discovered, amongst some Warblers sent to him by the Rev. Canon Tristram, a new species which he proposed to call *Phyllopneuste tristrami*, which now proves to be the bird described by Mr. von Homeyer. Mr. Brooks sent to Canon Tristram a short paper describing this species at the time that he wrote to me; but, owing

to some cause or another, it was not published, and it is now too late to do so. Directly I read Mr. von Homeyer's description of *Phyllopneuste brehmi*, I wrote to Mr. Brooks telling him that his bird had been, so far as I could judge, described; and he sent me his specimen, which I now exhibit, and which agrees precisely with Mr. von Homeyer's description.

"I beg also to lay before the Society another specimen of *Phyllopneuste brehmi*, procured near Constantinople by Mr. Robson, as also specimens of our common Chiffchaff (*P. rufa*) from Turkey, Italy, and Great Britain, in order to show the distinctness of the present species. When sending the above specimen of *P. brehmi*, Mr. Robson wrote to me as follows:—'The Chiffchaff here, I fully believe, is different from the English bird; at least I am certain the cry of the female is different. I suppose they build on the ground; but I have found no nests, though I have anxiously looked for them. I have shot the bird when ready to lay, and have seen old birds feeding their young.'"

The following papers were read:—

1. A Synonymic List of the Species formerly included in the Genus *Pieris*; with all others described since the Subdivision of the Group by recent Authors. By A. G. Butler, F.L.S., F.Z.S., &c.

[Received December 12, 1871.]

I have, for the last two or three years, devoted much time to the determination of the genera and species of the subfamily *Pierinæ*; and in an essay published in the third part of the 'Cistula Entomologica,' I investigated the structural characters of this group, separating it, by the neuration of the wings, form of antennæ and palpi, with other minor characters, into forty-eight genera: since the publication of this paper I have found it necessary to suppress one genus (*Heliochroma*), as I discovered that it was founded upon an abnormal species of *Hesperocharis*; I have also added two genera—*Larinopoda* (Trans. Ent. Soc. p. 172, Feb. 1871) and *Scalidoneura* (Proc. Zool. Soc. p. 250 (1871).

In the third part of my 'Lepidoptera Exotica' I commenced a revision of the species of the subfamily, with an illustrated monograph of the genus *Callidryas*, a paper now rather more than half finished; in March 1871 I gave a list of the species of *Ixias* in the 'Proceedings' of this Society, pp. 252–254; and in June a list of the species formerly included in *Terias*, pp. 526–541. I now propose to give a complete list of the species referred by authors to the old genus *Pieris*.

The genus *Pieris*, properly speaking, should perhaps have no place in zoological nomenclature; for if Schrank ever had a type for it, he did not fix it, and the first species that he mentions is *Parnassius apollo*. Latreille, I believe, subsequently fixed the type as

P. cardamines, but apparently did not know what he had done, as he began his arrangement of the group in his 'Enc. Méth.' with another orange-tipped species, *P. glaucippe*: he certainly was not followed by subsequent authors; and it would create much confusion to follow him now. I therefore prefer to retain the first section of Boisduval's *Pieris*, fixing as its type the *P. amathonte* of Cramer (see 'Cist. Ent.' p. 49), and for the present rejecting the synonymous genus *Perrhybris*, Hübner.

In the preparation of this paper I have been much assisted by proofs of Mr. Kirby's recently published 'Catalogue of Diurnal Lepidoptera,' forwarded to me by the author before the completion of that very useful work; and it is by his express desire that I so soon supplement a portion of that publication by a revision of this group of Butterflies.

I recognize fifteen genera as having formed parts of the great genus *Pieris* as employed in Doubleday, Westwood, and Hewitson's 'Genera of Diurnal Lepidoptera;' they now contain 341 described species in the following proportions:—

1.	*Prioneris*	9
2.	*Delias*	67
3.	*Mylothris*	14
4.	*Hesperocharis*	17
5.	*Leptophobia*	15
6.	*Pieris*	15
7.	*Appias*	66
8.	*Phrissura*	2
9.	*Daptonura*	13
10.	*Belenois*	43
11.	*Pontia*	32
12.	*Metaporia*	3
13.	*Synchloë*	38
14.	*Tatochila*	6
15.	*Herpænia*	1
		341

Genus 1. PRIONERIS, Wallace,
Trans. Ent. Soc. Lond. 3rd ser. vol. iv. p. 383 (1867).

1. PRIONERIS THESTYLIS.

♂. *Pieris thestylis*, Doubleday, in Gray's Zool. Miscell. p. 76 (1842); Gen. D. L. pl. 6. fig. 2 (1847).
N. India; Darjeeling, E. India. B.M.

2. PRIONERIS SETA.

♀. *Pieris seta*, Moore, Proc. Zool. Soc. London, p. 102, pl. 44. fig 3 (1857).
♂. *Prioneris seta* (part), Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 384. n. 2 (1867).
Darjeeling; Bhotan; Nepal. B.M.
I think it certain that this is not a variety of *P. thestylis*.

3. PRIONERIS WATSONII.

♂ ♀. *Prioneris watsonii*, Hewitson, Trans. Ent. Soc. London, p. 100 (1868).

♂. *Prioneris seta* (part), Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 384. n. 2 (1867).

Silhet. ♂, B.M.

Very like a dwarfed variety of the male *P. seta*, but with a female more nearly resembling itself.

4. PRIONERIS SITA.

♂. *Pieris sita*, Felder, Reise der Novara, Lep. ii. p. 161. n. 132, pl. 25. fig. 12 (1865).

♂, Ceylon; ♀, Himalayas. B.M.

The female of this species is a better mimic than the ♂, and only differs from *Delias eucharis* in neuration and in the squareness of the marginal red spots on under surface of hind wings.

5. PRIONERIS CLEMANTHE.

Pieris clemanthe, Doubleday, Ann. & Mag. Nat. Hist. xvii. p. 23 (1846).

Pieris helferi, Felder, Reise der Novara, Lep. ii. p. 161. n. 131, pl. 25. figs. 10, 11 ("1865").

Var.? *Pieris berenice*, Lucas, Rev. Zool. p. 324 (1852).

Silhet; Moulmein. B.M.

We have a specimen labelled "N. Australia," which is doubtless an error.

6. PRIONERIS VOLLENHOVII.

Prioneris vollenhovii, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 386. n. 6, pl. 9. fig. 3 (1867).

Borneo. B.M.

7. PRIONERIS CORNELIÆ.

Pieris corneliæ, Vollenhoven, Monogr. Pier. p. 5. no. 1, pl. 2. fig. 2 (1865).

Borneo. B.M.

8. PRIONERIS PHILONOME.

Pieris philonome, Boisduval, Sp. Gén. Lép. i. p. 543. n. 21 (1836).

Java.

Seems to come very near to *P. vollenhovii*; but may perhaps be a curious variety of *P. autothisbe*: I have never seen it.

9. PRIONERIS AUTOTHISBE.

♂. *Delias autothisbe*, Hübner, Samml. ex. Schmett. ii. pl. 123 (1816–24).

Java. B.M.

Genus 2. DELIAS, Hübner,
Verz. bek. Schmett. p. 91 (1816).

1. DELIAS PARTHENOPE.

Thyca parthenope, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 347. n. 8, pl. 6. figs. 5, 5 *a* (1867).
Penang. B.M.

2. DELIAS NINUS.

Thyca ninus, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 347. n. 9, pl. 7. fig. 1 (1867).
Malacca.
Possibly a variation of *T. parthenope*.

3. DELIAS PYRAMUS.

Thyca pyramus, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 347. n. 7 (1867).
Pieris thisbe, ♂, Boisduval, Sp. Gén. Lép. i. p. 449. n. 16 (1836); Gray, Lep. Ins. Nepal, p. 8, pl. 6. fig. 1 (1846).
Nepal. B.M.

4. DELIAS THYSBE.

Papilio thysbe, Cramer, Pap. Exot. iii. pl. 233. fig. C (1782).
Pieris acalis, Godart, Enc. Méth. ix. p. 148. n. 106 (1819).
China.

5. DELIAS CRITHOË.

Pieris crithoë, Boisduval, Sp. Gén. Lép. i. p. 450. no. 18 (1836).
Java. B.M.

6. DELIAS PASITHOË.

Papilio pasithoë, Linnæus, Syst. Nat. p. 755. n. 53 (1766); Donovan, Ins. China, pl. 30. fig. 2 (1799).
Papilio aglaia, Linnæus, Syst. Nat. i. p. 465. n. 44 (1758).
Var. *Papilio dione*, Drury, Ill. Ex. Ent. ii. pl. 8. figs. 3, 4 (1773).
Papilio porsenna, Cramer, Pap. Exot. i. pl. 43. figs. D, E (1776); iv. pl. 352. figs. A, B (1782).
Silhet; Nepal; Moulmein; China; Borneo. B.M.

7. DELIAS CHRYSORRHÆA.

Pieris chrysorrhœa, Vollenhoven, Mon. Pier. p. 6. n. 3, pl. 2. fig. 4 (1865).
Sumatra.
A species allied to *D. pasithoë*.

8. DELIAS EGIALEA.

Papilio egialea, Cramer, Pap. Exot. ii. pl. 189. figs. D, E (1779).
Delias tyche et *apriate*, Hübner, Verz. bek. Schmett. p. 91. n. 957, 958 (1816).

Pieris pasithoë, var., Godart, Enc. Méth. ix. p. 148. n. 105 (1819).

? *Papilio fusconiger* et *albopictus*, Goeze, Beytr. i. pp. 44, 45. n. 25, 26 (1779).

Java. B.M.

9. DELIAS OCHREOPICTA.

Thyca ochreopicta, Butler, Ann. & Mag. Nat. Hist. iv. p. 244 (1869); Lep. Exot. viii. p. 63. n. 3, pl. 24. figs. 4, 5 (1871).

Philippines (Luzon). B.M.

10. DELIAS HENNINGIA.

Pontia henningia, Eschscholtz, Kotzeb. Reise, iii. p. 214, pl. 9. figs. 20 *a*, 20 *b* (1821).

Philippines (Manilla). B.M.

11. DELIAS LUCERNA.

Thyca lucerna, Butler, Ann. & Mag. Nat. Hist. 4, vol. iv. p. 243 (1869); Lep. Exot. viii. p. 62. n. 2, pl. 24. figs. 2, 3 (1871).

Philippines (Mindanao?). B.M.

12. DELIAS PANDEMIA.

Thyca pandemia, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 346. n. 3, pl. 6. figs. 4, 4 *a* (1867).

Borneo. B.M.

13. DELIAS ITHIELA.

Thyca ithiela, Butler, Ann. & Mag. Nat. Hist. 4, vol. iv. p. 242 (1869); Lep. Exot. viii. p. 62. n. 1, pl. 24. fig. 1 (1871).

Darjeeling. B.M.

14. DELIAS BELLADONNA.

Papilio belladonna, Fabricius, Ent. Syst. iii. p. 180. n. 557 (1793); Donovan, Nat. Rep. i. pl. 35 (1823).

N. India? B.M.

15. DELIAS HORSFIELDII.

♂. *Pieris horsfieldii*, G. R. Gray, Zool. Miscell. p. 32 (1831); Herrich-Schäffer, Ex. Schmett. figs. 13, 14 (1850).

Nepal. B.M.

This species seems to be distinct from *D. belladonna*; but the difference may be due to errors in Donovan's figure or to sex.

16. DELIAS SANACA.

Pieris sanaca, Moore, Proc. Zool. Soc. p. 103, pl. 44. fig. 4 (1857).

Darjeeling. B.M.

17. DELIAS AGANIPPE.

Papilio aganippe, Donovan, Ins. New Holl. pl. 29 (1805).

King George's Sound; Adelaide; Moreton Bay. B.M.

18. DELIAS FRAGALACTEA.

Thyca fragalactea, Butler, Ann. & Mag. Nat. Hist. 4, vol. iv. p. 243 (1869); Lep. Exot. viii. p. 64. n. 5, pl. 24. fig. 7 (1871).
N. Australia. B.M.
This is probably a race of *D. argenthona*.

19. DELIAS ARGENTHONA.

Papilio argenthona, Fabricius, Ent. Syst. iii. p. 200. n. 624 (1793).
Pieris protocharis, Boisduval, Sp. Gén. Lép. i. p. 457. n. 27 (1836).
Australia; Moreton Bay; Richmond River. B.M.

20. DELIAS ROSENBERGII.

Pieris rosenbergii, Vollenhoven, Monogr. Pier. p. 11. n. 9, pl. 2. fig. 6, pl. 3. fig. 1 (1865).
Celebes. B.M.

21. DELIAS LORQUINII.

Pieris lorquinii, Felder, Reise der Novara, ii. p. 159. n. 128, pl. 24. figs. 9, 10 ("1865").
Celebes. B.M.
Allied to *D. rosenbergii*, but seems quite distinct.

22. DELIAS LUZONIENSIS.

Pieris luzoniensis, Felder, Wien. ent. Monats. vi. p. 285. n. 39 (1862).
Philippines (Luzon). B.M.

23. DELIAS HYPARETE.

Papilio hyparete, Linnæus, Mus. Lud. Ulr. p. 247 (1764); Clerck's Icones, pl. 38. fig. 2 (1764).
♀. *Papilio antonoë*, Cramer, Pap. Exot. iv. pl. 320. figs. A, B (1782).
Java; Sumatra; Borneo; Penang; Assam. B.M.

24. DELIAS HIERTE.

♂. *Delias hierte*, Hübner, Zutr. Ex. Schmett. figs. 77, 78 (1818).
♀, Siam; Penang. B.M.

25. DELIAS INDICA.

Thyca hierte, var. *indica*, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 351. n. 21 (1867).
Barrackpore; Dukhun; Moulmein. B.M.

26. DELIAS HÆMORRHÆA.

Pieris hæmorrhæa, Vollenhoven, Monogr. Pier. p. 10. n. 8, pl. 2. fig. 5 (1865).
Banca. B.M.

27. Delias stollii.

Papilio antonoë, Stoll (*nec* Cramer), Suppl. Cramer, pl. 33. figs. 2, 2*b* (1790).
China. B.M.
Our specimens agree with Stoll's figure, which looks a distinct species from Hübner's *D. hierte*.

28. Delias eucharis.

Papilio eucharis, Drury, Ill. Ex. Ent. ii. pl. 10. figs. 5, 6 (1773).
Pieris epicharis, Godart, Enc. Méth. ix. p. 153. n. 122 (1819).
Papilio hyparethe, Herbst, Natursyst. Schmett. pl. 101. figs. 3–5.
N. India; Nepal; Ceylon; Penang. B.M.

29. Delias mysis.

Papilio mysis, Fabricius, Syst. Ent. p. 475. n. 138 (1775); Donovan, Ins. New Holl. pl. 21. fig. 1 (1805).
Australia; Rockingham Bay. B.M.

30. Delias cruentata.

Pieris cruentata, Butler, Proc. Zool. Soc. London, p. 455, pl. 26. fig. 2 (1865).
Pieris lara, Vollenhoven (*nec* Boisduval), Monogr. Pier. p. 12. n. 11 (1865).
Mysol; Port Essington. B.M.
The insects received by Dr. Boisduval with the MS. name of *P. lara*, and supposed by him to represent a variety of *D. mysis*, can hardly be the same as *D. cruentata*, since they are described as having the black border on under surface of hind wings broader than in *D. mysis*; the reverse is the case with *D. cruentata*.

31. Delias cæneus.

Papilio cæneus, Linnæus, Mus. Lud. Ulr. p. 271 (1764).
Papilio discors, Gmelin, Syst. Nat. 1, v. p. 2261. n. 881 (1788–91).
Papilio ——, Zschach. Mus. Lesk. Ent. p. 88. n. 32 (1788).
Papilio antonoë, Herbst, Natursyst. Schmett. pl. 100. figs. 1–4.
Papilio anthonoë (sic), Herbst, Natursyst. v. Index.
Cathæmia anthyparete, Hübner, Verz. bek. Schmett. p. 92. n. 961 (1816).
Var. *Papilio plexaris*, Donovan, Ins. New Holl. pl. 18. fig. 2 (1805).
Pieris philyra, Godart, Enc. Méth. ix. p. 150. n. 113 (1819).
N. Ceram; and var. Amboina. B.M.

32. Delias philotis.

Thyca philotis, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 357. n. 44, pl. 8. fig. 4 (1867).
Bouru.

33. Delias duris.

Pieris duris, Hewitson, Exot. Butt. ii. *Pier.* pl. 5. fig. 34 (1861).
Ceram.

34. Delias agostina.

Pieris agostina, Hewitson, Ex. Butt. i. *Pier.* pl. 1. figs. 1, 2 (1852).
♀. *Pieris nesba*, Lucas, Rev. Zool. p. 324 (1852).
N. India; Darjeeling. B.M.

35. Delias blanca.

Pieris blanca, Felder, Wien. ent. Monats. vi. p. 284. n. 38 (1862); Reise der Novara, Lep. ii. p. 160. n. 130, pl. 24. figs. 6, 7 (1865).
Luzon.

36. Delias singhapura.

Thyca singhapura, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 353. n. 29, pl. 7. fig. 2 (1867).
Borneo; Sarawak. B.M.

37. Delias peribœa.

Pieris peribœa, Godart, Enc. Méth. ix. p. 154. n. 124 (1819).
Java.

38. Delias themis.

Pieris themis, Hewitson, Ex. Butt. ii. *Pier.* pl. 5. figs. 31, 32 (1861).
Philippines. B.M.

39. Delias gabia.

Pieris gabia, Boisduval, Voy. de l'Atrolabe, Lép. p. 49. n. 7 (1832).
Waigiou.

40. Delias dice.

Pieris dice, Vollenhoven, Monogr. Pier. p. 39. n. 5, pl. 4. fig. 7 (1865).
Papua.

41. Delias ennia.

Thyca ennia, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 355. n. 35, pl. 7. fig. 4 (1867).
Waigiou.

42. Delias bagoe.

Pieris bagoe, Boisduval, Voy. de l'Astrolabe, Lép. p. 49. n. 1 (1832); Wallace, Trans. Ent. Soc. 3, vol. iv. p. 355. n. 36, pl. 7. figs. 3, 3*a* (1867).
Aru, New Ireland.

43. DELIAS ZEBUDA.

Pieris zebuda, Hewitson, Exot. Butt. iii. *Pier.* pl. 7. figs. 49, 50 (1862).
Celebes. B.M.

44. DELIAS DESCOMBESI.

Pieris descombesi, Boisduval, Sp. Gén. Lép. i. p. 465. n. 39 (1836).
Silhet; Darjeeling; Nepal; Moulmein; Penang. B.M.

45. DELIAS STHENOBÆA.

Pieris sthenobœa, Boisduval, Sp. Gén. Lép. i. p. 466. n. 37 (1836).
Moluccas.
Perhaps a variety of *D. descombesi*; it differs only in the paler yellow and absence of red basal patch on under surface of hind wings.

46. DELIAS ARUNA.

♂. *Pieris aruna*, Boisduval, Voy. de l'Astrolabe, Lép. p. 48. n. 4 (1832); ♂ ♀, Hewitson, Ex. Butt. 2, *Pier.* pl. 3. figs. 20-22 (1861).
♀. *Pieris bajura*, Boisduval, Voy. de l'Astrolabe, Lép. p. 48. n. 5 (1832).
Papua; Waigiou; Batchian.

47. DELIAS INFERNA.

Delias inferna, Butler, Lep. Exot. 8, p. 63. n. 4, pl. 24. fig 6 (1871).
North-western Australia. B.M.

48. DELIAS BELISAMA.

Papilio belisama, Cramer, Pap. Exot. 3, pl. 258. figs. A–D (1782).
Java. B.M.

49. DELIAS GLAUCE.

Pieris glauce, Butler, Proc. Zool. Soc. p. 431. n. 2, pl. 25. fig. 2 (1865).
Borneo. B.M.

50. DELIAS ISSE.

Papilio isse, Cramer, Pap. Exot. i. pl. 55. figs. E, F (1779), iv. pl. 339. figs. C, D (1782).
Papilio bicolor, Gmelin, Syst. Nat. 1, v. p. 2261. n. 880 (1788–91); Zschach, Mus. Lesk. Ent. p. 88. n. 31 (1788).
Amboina, N. Ceram. B.M.

51. DELIAS ECHO.

Thyca echo, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 358. n. 47, pl. 8. fig. 3 (1867).
Bouru.

52. DELIAS CHRYSOMELÆNA.

Pieris chrysomelæna, Vollenhoven, Tijd. voor Ent. 2, vol. i. p. 57, pl. 1. figs. 1, 2 (1866).
Kaioa Island.

53. DELIAS ECHIDNA.

Pieris echidna, Hewitson, Ex. Butt. ii. *Pier.* pl. 5. figs. 35, 36 (1861).
Ceram.

54. DELIAS HIPPODAMIA.

Thyca hippodamia, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 359. n. 50, pl. 8. fig. 1 (1867).
Aru.

55. DELIAS DORIMENE.

Papilio dorimene, Cramer, Pap. Exot. iv. pl. 387. figs. C, D (1782).
Papilio fuliginosus, Gmelin, Syst. Nat. 1, v. p. 2261. n. 882 (1788–91); Zschach, Mus. Lesk. Ent. p. 88. n. 34 (1788).
Pieris ageleis, Godart, Enc. Méth. ix. p. 147. n. 103 (1819).
Ceram; Amboina. B.M.

56. DELIAS DORYLÆA.

Pieris dorylæa, Felder, Reise der Novara, Lep. ii. p. 182. n. 173 ("1865").
Aru.
Allied to *D. dorimene*.

57. DELIAS PŒCILEA.

Pieris pœcilea, Vollenhoven, Monogr. Pier. p. 13. n. 13, pl. 3. fig. 3 (1865).
Moluccas.

58. DELIAS CANDIDA.

Pieris candida, Vollenhoven, Monogr. Pier. p. 11. n. 10, pl. 3. fig. 2 (1865).
Batchian.

59. DELIAS HERODIAS.

Pieris herodias, Vollenhoven, Monogr. Pier. p. 14. n. 14, pl. 3. fig. 4 (1865).
Gilolo.

60. DELIAS TIMORENSIS.

♂. *Pieris timorensis*, Boisduval, Sp. Gén. Lép. i. p. 459. n. 30 (1836).
?♀. *Pieris vishnu*, Moore, Cat. Lep. East I. Comp. i. p. 83. n. 168, pl. 2ª. fig. 5 (1857).
Java. B.M.
I rather doubt the specific identity of the two sexes united above,

unless Dr. Boisduval's locality is incorrect, in which case I should suggest the adoption of Mr. Moore's name.

61. DELIAS NIGRINA.

Papilio nigrina, Fabricius, Syst. Ent. p. 475. n. 139 (1775); Donovan, Ins. New Holl. pl. 19. fig. 1 (1805).
Australia; Moreton Bay; Richmond River. B.M.

62. DELIAS HARPALYCE.

Papilio harpalyce, Donovan, Ins. New Holl. pl. 18. fig. 1 (1805).
Australia; Sydney. B.M.

63. DELIAS MOMEA.

Pieris momea, Boisduval, Sp. Gén. Lép. i. p. 477. n. 56 (1836).
Java. B.M.

64. DELIAS NYSA.

♂. *Papilio nysa*, Fabricius, Syst. Ent. p. 473. n. 128 (1775).
♀. *Papilio endora*, Donovan, Ins. New Holl. pl. 20. fig. 2 (1805).
Australia; Moreton Bay. B.M.

65. DELIAS ORPHNE.

Pieris orphne, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 361. n. 56, pl. 8. fig. 2 (1867).
Malacca.

66. DELIAS GEORGINA.

Pieris georgina, Felder, Wien. ent. Monats. v. p. 298. n. 5 (1861); Reise der Novara, Lep. ii. p. 160. n. 129, pl. 24. figs. 4, 5 ("1865").
Luzon.

67. DELIAS? FURVUS.

Papilio furvus, Goeze, Beytr. i. p. 182. n. 77 (1779); Seba, Thes. pl. iv. figs. 13, 14.
—— ?

Genus 3. MYLOTHRIS, Hübner.
Verz. bek. Schmett. p. 90 (1816).

1. MYLOTHRIS POPPEA.

Papilio poppea, Cramer, Pap. Exot. ii. pl. 110. fig. D (1779).
Papilio poppa, Herbst, Natursyst. Schmett. pl. 89. fig. 5.
Sierra Leone. B.M.

2. MYLOTHRIS RHODOPE.

Papilio rhodope, Fabricius, Syst. Ent. p. 473. n. 130 (1775); Donovan, Nat. Rep. iii. pl. 86 (1825).
Ashanti; Sierra Leone. B.M.

3. MYLOTHRIS TRIMENIA.

Pieris trimenia, Butler, Cist. Ent. p. 13 (1869).

Pieris agathina, var. B, Trimen, Rhop. Afr. Austr. p. 29, pl. 2. fig. 2 (1866).
Port Natal. B.M.

4. MYLOTHRIS AGATHINA.

Papilio agathina, Cramer, Pap. Exot. iii. pl. 237. figs. D, E (1782).
Papilio agatina, Herbst, Natursyst. Schmett. pl. 104. figs. 4, 5.
Cathæmia xantholeuca, Hübner, Verz. bek. Schmett. p. 92. n. 964 (1816).

Var. *Pieris rüppellii*, Koch, Indo-Austr. Lep.
Zulu; Port Natal; Abyssinia. B.M.

5. MYLOTHRIS PHILERIS.

♂. *Pieris phileris* (part.), Boisduval, Faun. de Madag. p. 17. n. 2, pl. 2. figs. 3, 4 (1833).
S. Africa; Madagascar.
Close to *M. agathina*.

6. MYLOTHRIS? PAROREIA.

Pieris paroreia, Hewitson, Trans. Ent. Soc. Lond. p. 72. n. 2 (1869).
Cape Coast.

7. MYLOTHRIS BERNICE.

Pieris bernice, Hewitson, Ex. Butt. iii. *Pier.* pl. 8. figs. 52, 53 (1866).
Gaboon.

8. MYLOTHRIS CHLORIS.

Papilio chloris, Fabricius, Syst. Ent. p. 473. n. 129 (1775); Drury, Ill. Ex. Ent. iii. pl. 32. figs. 3, 4 (1782).
Papilio thermopyle, Cramer, Pap. Exot. iii. pl. 207. figs. F, G (1782).
Sierra Leone. B.M.

9. MYLOTHRIS LYPERA.

Pieris lypera, Kollar, Denkschr. Akad. Wiss. Wien, math.-nat. Cl. i. p. 361. n. 26, pl. 45. figs. 1, 2 (1850).
Bogota. B.M.

10. MYLOTHRIS LEPTALINA.

Pieris leptalina, Bates, Journ. Entom. i. p. 236. n. 7 (1861).
St. Paulo.

11. MYLOTHRIS PYRRHA.

♂. *Papilio pyrrha*, Fabricius, Syst. Ent. p. 464. n. 95 (1775).
Papilio iphigenia, Schulz. Naturforscher, ix. p. 108, pl. 2 (1776).

♂, ♀. *Perrhybris eleidias*, Hübner, Samml. ex. Schmett. pl. 121 (1816–24).
♀. *Papilio pamela*, Cramer, Pap. Exot. iv. pl. 319. fig. A (1782).
Brazil; Tapajos. B.M.

12. MYLOTHRIS VIARDI.

Pieris viardi, Boisduval, Sp. Gén. Lép. i. p. 439. n. 3 (1836).
Mexico.

13. MYLOTHRIS MALENKA.

Pieris malenka, Hewitson, Exot. Butt. i. *Pier.* pl. 1. figs. 5, 6 (1852).
Venezuela. B.M.

14. MYLOTHRIS LORENA.

Pieris lorena, Hewitson, Ex. Butt. i. *Pier.* pl. 1. fig. 7 (1852).
Villa Nova; St. Paulo; Tunantins; Peru; Bogotá. ♂. B.M.

Genus 4. HESPEROCHARIS, Felder,
Verhandl. Zool.-botan. Gesellsch. Wien, p. 493 (1862).

1. HESPEROCHARIS GRAPHITES.

Hesperocharis graphites, Bates, Ent. Mo. Mag. i. p. 32. n. 12 (1864).
Guatemala.

2. HESPEROCHARIS AVIVOLANS.

Pieris avivolans, Butler, Proc. Zool. Soc. p. 457, pl. 26. fig. 4 (1865).
Mexico. B.M.
A local representative of *H. graphites*.

3. HESPEROCHARIS COSTARICENSIS.

Hesperocharis costaricensis, Bates, Ent. Mo. Mag. iii. p. 49. n. 85 (1866).
Costa Rica.

4. HESPEROCHARIS MARCHALII.

Pieris marchalii, Guérin, Icon. Règne Anim. Ins. texte, p. 468 (1844).
Venezuela. B.M.

5. HESPEROCHARIS CATOGRAMMA.

Pieris catogramma, Kollar, Denkschr. Akad. Wiss. Wien, math. Cl. i. p. 361. n. 28 (1850).
Bolivia. B.M.

6. HESPEROCHARIS EROTA.

Pieris erota, Lucas, Rev. Zool. p. 329 (1852).
Brazil. B.M

7. HESPEROCHARIS CROCEA.

Hesperocharis crocea, Bates, Ent. Mo. Mag. iii. p. 49. n. 84 (1866).
Costa Rica.

8. HESPEROCHARIS IDIOTICA.

Helichroma idiotica, Butler, Cist. Ent. i. p. 15 (1869); Lep. Exot. ix. p. 70, pl. 27. fig. 2 (1871).
——?

9. HESPEROCHARIS LENORIS.

Pieris lenoris, Reakirt, Proc. Ac. Nat. Sci. Philad. p. 336. n. 37 (1866).
Mexico.
Allied to *H. idiotica*.

10. HESPEROCHARIS GAYI.

Pieris gayi, Blanchard, Gay's Faun. Chil. vii. p. 10, pl. 1. fig. 4 (1852).
Chili. B.M.

11. HESPEROCHARIS LEUCANIA.

Pieris leucania, Boisduval, Sp. Gén. Lép. i. p. 493. no. 83 (1836).
? *Pieris pasion*, Reakirt, Proc. Akad. Nat. Sci. Philad. p. 336. n. 38 (1866).
Mexico. B.M.

12. HESPEROCHARIS ANGUITIA.

Pieris anguitia, Godart, Enc. Méth. ix. p. 146. n. 100 (1819); Hübner, Zuträge ex. Schmett. figs. 889, 890 (1837).
Brazil. B.M.

13. HESPEROCHARIS NEREIS.

Hesperocharis nereis, Felder, Reise der Novara, ii. p. 146. n. 112 (1865).
E. Peru; Bolivia; Bogota. B.M.

14. HESPEROCHARIS NERA.

Pieris nera, Hewitson, Exot. Butt. i. *Pier.* pl. 1. figs. 3, 4 (1852).
Tapajos. B.M.

15. HESPEROCHARIS HELVIA.

Pieris helvia, Latreille, in Humboldt & Bonpland's Obs. Zool. ii. p. 121, pl. 41. figs. 1, 2 (1811–19).
Mexico.

16. HESPEROCHARIS HIRLANDA.

Papilio hirlanda, Stoll, Suppl. Cramer, pl. 35. figs. 1, 1 *a* (1790).
Archidona. B.M.

17. HESPEROCHARIS FULVINOTA.

Hesperocharis fulvinota, Butler, Ann. & Mag. Nat. Hist. p. 284 (Oct. 1871); Lep. Exot. xi. pl. 34. fig. 4 (Jan. 1872).
Back of Rio. B.M.

Genus 5. LEPTOPHOBIA, Butler.
Cist. Ent. iii. pp. 35 & 45, gen. 18 (1870).

1. LEPTOPHOBIA ELEONE.

Pieris eleone, Doubleday & Hewitson, Gen. D. L. pl. 6. fig. 6 (1847).
Bolivia; Quito; Bogota; Venezuela. B.M.

2. LEPTOPHOBIA CÆSIA.

Pieris cæsia, Lucas, Rev. Zool. p. 299 (1852); Hewitson, Ex. Butt. ii. *Pier.* pl. 6. figs. 43, 44 (1861).
Quito.

3. LEPTOPHOBIA SEMICÆSIA.

Pieris semicæsia, Felder, Reise Nov. Lep. ii. p. 176. n. 164 ("1865").
New Granada.
Near *L. pentica*.

4. LEPTOPHOBIA PENTICA.

♂. *Leptalis? pentica*, Kollar, Denkschr. Akad. Wiss. Wien, math.-nat. Cl. i. p. 360. n. 25, pl. 45. figs. 11, 12 (1850).
♀. *Pieris stamnata*, Lucas, Rev. Zool. p. 330 (1852).
♂, Venezuela; ♀, Bogota. B.M.

5. LEPTOPHOBIA EUTHEMIA.

Pieris euthemia, Felder, Wien. ent. Mon. v. p. 80. n. 29 (1861).
Venezuela.
Allied to *L. pentica*.

6. LEPTOPHOBIA CINEREA.

Pieris cinerea, Hewitson, Trans. Ent. Soc. 3rd ser. vol. v. p. 563. n. 6 (1867).
Ecuador.

7. LEPTOPHOBIA PHILOMA.

Pieris philoma, Hewitson, Equat. Lep. p. 79. n. 144 (1870).
Ecuador (*Buckley*).

8. LEPTOPHOBIA BALIDIA.

Pieris balidia, Boisd. Sp. Gén. Lép. i. p. 529. n. 133 (1836).
Rio Janeiro; Panamá. B.M.

9. LEPTOPHOBIA ELODIA.

Pieris elodia, Boisduval, Sp. Gén. Lép. i. p. 529. n. 134 (1836); Hübner, Zutr. ex. Schm. figs. 853, 854 (1837).
♀. *Pieris suadella*, Felder, Wien. ent. Mon. v. p. 79. n. 26 (1861).

Var.? *Pieris eleusis*, Lucas, Rev. Zool. p. 331 (1852).
Mexico; Polochic Valley; Venezuela. B.M.

10. LEPTOPHOBIA HELENA.

Pieris helena, Lucas, Rev. Zool. p. 332 (1852).
Quito. B.M.

11. LEPTOPHOBIA OLYMPIA.

Pieris olympia, Felder, Wien. ent. Mon. v. p. 80. n. 28 (1861).
Venezuela.

12. LEPTOPHOBIA TOVARIA.

Pieris tovaria, Felder, Wien. ent. Mon. v. p. 80. n. 27 (1861).
Venezuela.

13. LEPTOPHOBIA PINARA.

Pieris pinara, Felder, Reise Nov. Lep. ii. p. 179. n. 169 ("1865").
Bolivia. B.M.

14. LEPTOPHOBIA ARIPA.

Pieris aripa, Boisduval, Sp. Gén. Lép. i. p. 528. n. 131 (1836).
Brazil. B.M.

15. LEPTOPHOBIA PYLOTIS.

Pieris pylotis, Godart, Enc. Méth. ix. p. 158. n. 137 (1819).
Brazil. B.M.

Genus 6. PIERIS*, Boisduval.
Sp. Gén. Lép. i. p. 434, sect. 1 (1836).

1. PIERIS MENACTE.

Pieris menacte, Boisduval, Sp. Gén. Lép. i. p. 517. n. 116 (1836).
Venezuela. B.M.

2. PIERIS? KIÇAHA.

Pieris kiçaha, Reakirt, Proc. Ent. Soc. Philad. ii. p. 349. n. 9 (1863).
Honduras.

3. PIERIS AMARYLLIS.

Papilio amaryllis, Fabricius, Ent. Syst. iii. p. 189. n. 586 (1797); Donovan, Ins. Ind. pl. 28. fig. 1 (1800).
Jamaica. B.M.

4. PIERIS JOSEPHINA.

Pieris josephina, Godart, Enc. Méth. ix. p. 158. n. 136 (1819).
♀. *Catophaga josephine*, Hübner, Samml. ex. Schm. ii. pl. 126 (1819–36).

* *P. antsianaka* of Ward (E. M. M. vii. p. 30, 1870) is a *Nepheronia*; *P. mananhari* (E. M. M. vi. p. 224, 1870) a *Teracolus*; *P. eunoma* of Hopffer (Peters, Reise, pl. 23. 1, 2) belongs also to the latter genus.

Pieris josepha, Salvin and Godman, Ann. and Mag. Nat. Hist. s. 4, vol. ii. p. 150. n. 22 (1868).
♂. Mexico; ♂ ♀. Haiti. B.M.
There is no appreciable difference between the Mexican and Haitian examples of this species.

5. PIERIS BUNIÆ.

Catophaga buniæ, Hübner, Samml. exot. Schmett. ii. pl. 125 (1816–36).
Pieris endeis, Godart, Enc. Méth. ix. p. 158. n. 135 (1819).
Brazil. B.M.

6. PIERIS THALOË.

Pieris thaloë, Godart, Enc. Méth. ix. p. 156. n. 131 (1819); Lucas, Lep. Exot. pl. 27. fig. 1 (1835).
Pieris ausia, Boisduval, Sp. Gén. Lép. i. p. 531. n. 137 (1836).
Tapajos; Pará; Venezuela. B.M.

7. PIERIS DEMOPHILE.

♀. *Papilio demophile*, Linnæus, Syst. Nat. 12, p. 761. n. 82 (1767).
Papilio molphea, Cramer, Pap. Exot. ii. pl. 116. fig. C (1779).
♂. *Papilio amathonte*, Cramer, Pap. Exot. ii. pl. 116. figs. A, B (1779).
Brazil; Tapajos; St. Paulo. B.M.

8. PIERIS CALYDONIA.

Pieris calydonia, Boisduval, Sp. Gén. Lép. i. p. 439. n. 2 (1836).
Venezuela. B.M.

9. PIERIS MARANA.

Pieris marana, Doubleday, Ann. & Mag. Nat. Hist. xiv. p. 421 (1844); Hewitson, Ex. Butt. ii. *Pier.* pl. 6. fig. 42 (1861).
Valley of Chimborazo; W. coast of Mexico; Panamá. B.M.

10. PIERIS PANDOSIA.

Pieris pandosia, Hewitson, Ex. Butt. i. *Pier.* pl. 2. fig. 14 (1853), ii. *Pier.* pl. 6. fig. 39 (1861).
Venezuela. B.M.

11. PIERIS PISONIS.

Pieris pisonis, Hewitson, Exot. Butt. ii. *Pier.* pl. 6. figs. 40, 41 (1861).
E. Peru. B.M.

12. PIERIS HABRA.

Pieris habra, Doubleday, Ann. & Mag. Nat. Hist. xvii. p. 22 (1846); Doubl. & Hewitson, Gen. D. L. pl. 6. fig. 1 (1847).
Honduras. B.M.

13. Pieris locusta.

Pieris locusta, Felder, Wien. ent. Mon. v. p. 81. n. 31 (1861); Reise Nov. Lep. ii. p. 175. n. 163, pl. 25. figs. 8, 9 ("1865").
Bogotá. B.M.

14. Pieris sevata.

Pieris sevata, Felder, Wien. ent. Monat. v. p. 81. n. 32 (1861).
New Granada; Venezuela.

15. Pieris diana.

Pieris diana, Felder, Wien. ent. Mon. v. p. 81. n. 33 (1861).
New Granada.

Genus 7. Appias, Hübner.
Verz. bek. Schmett. p. 91 (1816).

1. Appias cardena.

Pieris cardena, Hewitson, Ex. Butt. ii. *Pier.* pl. 3. figs. 17, 18 (1861).
Var. *Pieris hagar*, Vollenhoven, Monogr. Pier. p. 38. n. 49, pl. 4. fig. 6 (1865).
Sarawak. B.M.

2. Appias hombronii.

Pieris hombronii, Lucas, Rev. Zool. p. 325 (1852); Vollenhoven, Mon. Pier. p. 5. n. 2, pl. 2. fig. 3 (1865).
Celebes.

3. Appias alope.

♂. *Tachyris alope*, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 572. n. 24 (1867).
Pieris amasene, Boisduval (nec Cramer), Sp. Gén. Lép. i. p. 535. n. 143 (1836).
♀. *Pieris neombo*, Moore, Cat. Lep. E. I. C. i. pl. 2*a*. fig. 3 (1857).
Java; Sumatra; Borneo. B.M.
Both sexes stand as *P. neombo* in Dr. Horsfield's collection.

4. Appias psyche.

Pieris psyche, Felder, Reise der Novara, Lep. ii. p. 166. n. 143 (1865).
New Caledonia.

5. Appias galathea.

Pieris galathea, Felder, Verh. Zool.-bot. Ges. Wien, xii. p. 485. n. 120 (1862).

Var. *Pieris galene*, Felder, Reise der Novara, Lep. ii. p. 165. n. 141 ("1865").
Sambelong; Ceylon.
Allied to *A. albina*.

6. Appias ega.

♂. *Pieris ega*, Boisduval, Sp. Gén. Lép. 1, p. 536. n. 144 (1836); Feisthamel, Rev. Zool. pl. 18. fig. 2 (1839).

♀. *Pieris melania*, Boisduval (nec Fabricius), Sp. Gén. Lép. i. p. 537. n. 146 (1836).

Var. *Pieris melania*, var. *caledonica*, Felder, Verh. Zool.-botan. Ges. xii. p. 495. n. 207 (1862).

Frankland Isles; New Caledonia; Port Stephen; Clarence River; Hunter River. B.M.

7. Appias agave.

Pieris agave, Felder, Wien. ent. Monats. vi. p. 286. n. 44 (1862).

Pieris zoë, Vollenhoven, Monogr. Pier. p. 37. n. 48, pl. 4. fig. 5 (1865).

Tachyris jacquinotii, Wallace (nec Lucas) Trans. Ent. Soc. London, 3, vol. iv. p. 372. n. 23 (1867).

Philippines. B.M.

8. Appias paulina.

♀. *Papilio paulina*, Cramer, Pap. Exot. ii. pl. 110. figs. E, F (1779).

Catophaga leis, Hübner, Zutr. ex. Schmett. figs. 771, 772 (1832).

Java; Penang; Moulmein; Assam. B.M.

9. Appias neombo.

♀. *Pieris neombo*, Boisduval, Sp. Gén. Lép. i. p. 539. n. 148 (1836).

Ceylon. B.M.

10. Appias leptis.

Pieris leptis, Felder, Reise, Nov. Lep. ii. p. 163. n. 136 ("1865").

Pieris paulina, Boisduval, Sp. Gén. Lép. i. p. 538. n. 147 (1836).

Java. B.M.

11. Appias urania.

Tachyris urania, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 371. n. 22 (1867).

Celebes.

12. Appias amarella.

Tachyris amarella, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 373. n. 25, pl. 9. fig. 2 (1867).

New Caledonia. B.M.

13. Appias acrisa.

Pieris acrisa, Boisduval, Bull. Soc. Ent. France, p. 156 (1859).

Woodlark Island.

14. Appias celestina.

♂. *Pieris celestina*, Boisduval, Voy. de l'Astrolabe, Lép. p. 46. n. 1 (1832); Lucas, Lép. Exot. pl. 23. fig. 1 (1835); ♀, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 374. n. 28, pl. 8. figs. 6, 6*a* (1867).
Aru Islands. B.M.

15. Appias melania.

♀. *Papilio melania*, Fabricius, Syst. Ent. p. 475. n. 140 (1775); Butler in Brenchley's Voy. App. (pl. 4 of Lep.) figs. 4, 5, ined.
Australia. Coll. Banks in B.M.
I think there is no doubt that this is a female *Appias* near *A. celestina*.

16. Appias athama.

Pieris athama, Lucas, Rev. Zool. p. 336 (1852); Blanchard, Voy. Pôle Sud, p. 381, pl. 1. figs. 10, 11 (1853).
New Caledonia. B.M.

17. Appias clementina.

Pieris clementina, Felder, Sitzungsber. Ak. Wiss. Wien, math.-nat. Cl. xl. p. 448. n. 1 (1860); Reise der Novara, Lep. ii. p. 162. n. 133, pl. 25. fig. 6 ("1865").
Amboina; Ceram.

18. Appias cynisca.

Tachyris cynisca, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 375. n. 31 (1867).
Bouru.

19. Appias eumelis.

Pieris eumelis, Boisduval, Voy. de l'Astrolabe, Lép. p. 50. n. 8 (1832).
New Ireland.

20. Appias cycinna.

♂. *Pieris cycinna*, Hewitson, Ex. Butt. ii. *Pier.* pl. 4. figs. 23, 26, Introd. p. 4 (1861).
Pieris concinna, Hewitson, *l. c.* text (1861).
♀. *Pieris ocina*, Hewitson, *l. c.* figs. 24, 25 (1861).
Aru. B.M.

21. Appias corinna.

Tachyris corinna, Wallace, Trans. Ent. Soc. 3, vol. iv. p. 377. n. 35 (1867).
Waigiou.

22. Appias liberia.

Papilio liberia, Cramer, Pap. Exot. iii. pl. 210. figs. G, H (1782).
Amboina.

23. APPIAS ELIADA.

Pieris eliada, Hewitson, Ex. Butt. ii. *Pier.* pl. 4. figs. 27, 28 (1861).

Pieris liberia, Hewitson, *l. c.* Introd. p. 4 (1861); Vollenhoven, Monogr. Pier. p. 45. n. 60, pl. 5. fig. 4 (1865).

Ceram. B.M.

24. APPIAS PLACIDIA.

Papilio placidia, Stoll, Suppl. Cramer, pl. 28. figs. 4, 4 c (1790).

Ceram; Amboina. B.M.

25. APPIAS FATIME.

Pieris fatime, Vollenhoven, Tijd. voor Ent. 2, vol. i. p. 59, pl. 2. figs. 1, 2 (1866).

Celebes.

26. APPIAS NERO.

♂. *Papilio nero*, Fabricius, Ent. Syst. iii. p. 153. n. 471 (1793); Donovan, Ins. Ind. pl. 32. fig. 1 (1800).

Pieris thyria, Godart, Enc. Méth. ix. p. 147. n. 101 (1819); Lucas, Lép. Exot. pl. 25. fig. 3 (1835).

♀? *Pieris figulina*, Butler, Ann. & Mag. Nat. Hist. 3, vol. xx. p. 399, pl. 8. fig. 1 (1867).

Java; Siam; Singapore; Borneo. B.M.

27. APPIAS GALBA.

Tachyris galba, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 378. n. 41 (1867).

Silhet. B.M.

28. APPIAS DOMITIA.

Pieris domitia, Felder, Wien. ent. Monats. vi. p. 285. n. 41 (1862).

Philippines. B.M.

29. APPIAS ZARINDA.

Pieris zarinda, Boisduval, Sp. Gén. Lép. i. p. 486. n. 73, pl. 18. fig. 4 (1836).

Celebes. B.M.

30. APPIAS BOURUENSIS.

Tachyris bouruensis, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 379. n. 44 (1867).

Bouru.

31. APPIAS ZAMBOANGA.

Pieris zamboanga, Felder, Wien. ent. Monats. vi. p. 285. n. 42 (1862); Reise Nov. Lep. ii. p. 162. n. 134, pl. 24. figs. 2, 3 (1865).

Philippines. B.M.

32. Appias asterope.

Pieris asterope, Felder, Wien. ent. Monats. vi. p. 286. n. 43 (1862).
Luzon.

33. Appias ithome.

♂. *Pieris ithome*, Felder, Wien. ent. Monats. iii. p. 180. n. 2, pl. 4. fig. 1 (1859); ♀, Vollenhoven, Monogr. Pier. p. 391. n. 52, pl. 5. fig. 1 (1865).
Celebes. B.M.

34. Appias nephele.

Pieris nephele, Hewitson, Ex. Butt. ii. *Pier.* pl. 5. fig. 33 (1861).
Philippines. B.M.

35. Appias clavis.

Tachyris clavis, Wallace, Trans. Ent. Soc. 3, vol. iv. p. 367. n. 13 (1867).
Ké Island. B.M.

36. Appias ada.

Papilio ada, Cramer, Pap. Exot. iv. pl. 363. figs. C, D (1782).
Pieris cilla, Felder, Reise der Novara, Lep. ii. p. 164. n. 139 ("1865").
Aru. B.M.

37. Appias enarete.

Pieris enarete, Boisduval, Sp. Gén. Lép. i. p. 480. n. 61 (1836); Feisthamel, Rev. Zool. pl. 18. fig. 1 (1839).
Borneo. B.M.

38. Appias hippo.

♀. *Papilio hippo*, Cramer, Pap. Exot. iii. pl. 195. figs. B, C (1782).
Ceylon. B.M.
The Ceylonese specimens differ slightly from the typical form from Sumatra, the hind wings of the male being more deeply coloured beneath, and those of the female paler on both surfaces; if these differences prove to be constant, the two forms will have to be separated.

39. Appias vacans.

♀. *Appias vacans*, Butler, Trans. Ent. Soc. Lond. p. 490 (1870); Lep. Exot. ii. pl. 34. figs. 5, 6 (Jan. 1872).
Darjeeling. Coll. H. Roberts.

40. Appias eleonora.

Pieris eleonora, Boisduval, Sp. Gén. Lép. i. p. 481. n. 64 (1836).
Silhet; Moulmein. B.M.
Boisduval gives Amboina as the locality; but I think this must be an error.

41. Appias andrea.

♂. *Colias andrea*, Eschscholtz, Kotzeb. Reise, iii. p. 215, pl. 23. figs. *a*, *b* (1821).

♀ var.? *Papilio cneora*, Fabricius, Ent. Syst. iii. p. 200. n. 626 (1793).

Philippines. B.M.

42. Appias formosana.

Pieris formosana, Wallace, Proc. Zool. Soc. p. 356. n. 5 (1866).

——? B.M.

43. Appias lycaste.

Pieris lycaste, Felder, Reise der Novara, Lep. ii. p. 164. n. 138 ("1865").

Celebes. B.M.

44. Appias lyncida.

♂. *Papilio lyncida*, Cramer, Pap. Exot. ii. pl. 131. fig. B (1779).

Mylothris monuste, Hübner, Verz. bek. Schmett. p. 91. n. 946 (1816).

Pieris enyo, Boisduval, Sp. Gén. Lép. i. p. 481. n. 65 (1836).

♀. *Pieris hippo* (part), Vollenhoven, Monogr. Pier. p. 42. n. 55 (1865).

Java. B.M.

We have specimens, possibly referable to this species, from Baly, Lombock, and Amboina; but until I have seen more examples I hesitate to consider them identical with it.

45. Appias lynceola.

Pieris lynceola, Felder, Reise der Novara, Lep. ii. p. 164. n. 137 ("1865").

Timor.

A local form of *A. lyncida*.

46. Appias abnormis.

Tachyris abnormis, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 368. n. 14, pl. 8. fig. 5 (1867).

Papua.

47. Appias panthea.

Tachyris panthea, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 376. n. 33 (1867).

Philippines. B.M.

48. Appias panda.

Pieris panda, Godart, Enc. Méth. ix. p. 147. n. 102 (1819).

Pieris sulphurea, Vollenhoven, Monogr. Pier. p. 32. n. 41, pl. 4. fig. 4 (1865).

Java. B.M.

49. APPIAS ALBINA.

♂. *Pieris albina*, Boisduval, Sp. Gén. Lép. i. p. 480. n. 62 (1836).
Pieris nathalia, Felder, Wien. ent. Monats. vi. p. 285. n. 40 (1862).
Philippines; Celebes. B.M.

50. APPIAS DARADA.

Pieris darada, Felder, Reise der Novara, Lep. ii. p. 166. n. 142 ("1865").
Moulmein. B.M.

51. APPIAS LIBYTHEA.

♀. *Papilio libythea*, Fabricius, Syst. Ent. p. 471. n. 120 (1775).
Papilio zelmira, Cramer, Pap. Exot. iv. pl. 320. figs. E, F (1782).
Papilio libithea (sic), Herbst, Natursyst. Schmett. pt. 5, Index.
Pieris libitina, Godart, Enc. Méth. ix. p. 133. n. 44 (1819).
Pieris nerissa, Godart, Enc. Méth. ix. p. 142. n. 84 (1819).
♂. *Pieris rouxii*, Boisduval, Sp. Gén. Lép. i. p. 481. n. 63 (1836).
Pieris jacquinotii, Lucas, Rev. Zool. p. 326 (1852).
Punjaub; Barrackpore; Ceylon. B.M.

52. APPIAS ZELMIRA.

Papilio zelmira, Cramer, Pap. Exot. iv. pl. 320. figs. C, D (1782).
? *Pieris larissa*, Felder, Reise der Novara, Lep. ii. p. 166. n. 144 ("1865").
Silhet; Moulmein; ? E. Indies. B.M.

53. APPIAS SABA.

Papilio saba, Fabricius, Sp. Ins. ii. p. 46. n. 199 (1781).
Papilio epaphia, Cramer, Pap. Exot. iii. pl. 207. figs. D, E (1782).
Papilio hypatia, Drury, Ill. Ex. Ent. iii. pl. 32. figs. 5, 6 (1782).
Pieris higinia, Godart, Enc. Méth. ix. p. 133. n. 45 (1819).
Pieris malatha, Boisduval, Faun. de Madag. p. 18. n. 4, pl. 1. figs. 4, 5 (1833).
? *Papilio nigricantemarginatus*, Goeze, Beytr. i. p. 184. n. 95 (1779).
Ashanti; Sierra Leone; Port Natal. B.M.

54. APPIAS POEYI, sp. nov.

♀. *Pieris ilaire*, Poey (*nec* Godart), Cent. Lep. (1833).
St. Domingo; Panamá; Honduras. B.M.
The species figured by Poey has nothing to do with the Brazilian *A. ilaire*, although much like it in the male sex.

55. APPIAS ILAIRE.

♂. *Pieris ilaire*, Godart, Enc. Méth. ix. p. 142. n. 83 (1819).
Papilio albunea, Dalman, Anal. Ent. p. 39 (1823).
Brazil. B.M.

56. Appias margarita.

Mylothris margarita, Hübner, Samml. ex. Schmett. (1816–41).
Panamá. B.M.
Nearly allied to *A. ilaire*.

57. Appias drusilla.

Papilio drusilla, Cramer, Pap. Exot. ii. pl. 207. fig. C (1779).
Honduras. B.M.

58. Appias castalia.

♂. *Papilio castalia*, Fabricius, Ent. Syst. iii. p. 188. n. 580 (1793); Donovan, Ins. Ind. pl. 28. fig. 3 (1800).
♀. *Pieris mysia*, Godart, Enc. Méth. ix. p. 143. n. 87 (1819).
♀. ? *Papilio fuscofimbriatus*, Goeze, Beytr. p. 182. n. 81 (1779).
Brazil. B.M.

59. Appias molpodia.

Mylothris molpodia, Hübner, Zutr. ex. Schmett. figs. 259, 260 (1823).
Jamaica. B.M.

60. Appias pandione.

Hiposcritia pandione, Hübner, Zutr. ex. Schmett. figs. 651, 652 (1832).
Pieris philonome, Lucas (*nec* Boisduval), Rev. Zool. p. 334 (1852).
Pieris paulina, var., Vollenhoven, Monogr. Pier. p. 33. n. 43 (1865).
Java. B.M.

61. Appias lucasii.

Tachyris lucasii, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 381. n. 50 (1867).
Pieris pandione, ♂, Boisduval, Sp. Gén. Lép. i. p. 537. n. 145 (1836).
Java.
Intermediate between *A. indra* and *A. durvasa* (*Lalage*, ♂ var.).

62. Appias indra.

Pieris indra, Moore, Proc. Zool. Soc. p. 103, pl. 44. fig. 5 (1857).
Silhet; Darjeeling; Calcutta. B.M.

63. Appias lalage.

Pieris lalage, Doubleday in Gray's Zool. Miscell. p. 76 (1842); Gen. Diurn. Lepid. pl. 6. fig. 5 (1847).
Var. ? *Pieris ida*, Lucas, Rev. Zool. p. 335 (1852).
Pieris durvasa, Moore, Proc. Zool. Soc. p. 103, pl. 44. fig. 6 (1857).
Silhet, Assam, Darjeeling, Nepal, E. India. B.M.

64. Appias phœbe.

Pieris phœbe, Felder, Wien. ent. Monats. v. p. 299. n. 7 (1861); Reise der Novara, Lep. ii. p. 163. n. 135, pl. 25. fig. 5 (1865).
Luzon.

65. Appias zamora.

♀. *Pieris zamora*, Felder, Wien. ent. Monats. vi. p. 286. n. 45 (1862).
Philippines.
Closely allied to *A. phœbe*.

66. Appias albomaculatus.

Papilio albomaculatus, Goeze, Beytr. i. p. 182. n. 79 (1779); Seba, Thes. iv. pl. 13. figs. 7, 8.
——?

Genus 8. Phrissura, Butler,
Cist. Ent. iii. pp. 37, 49 (1870); Tr. Ent. Soc. Lond. p. 171 (1871).

1. Phrissura polisma.

♂. *Pieris polisma*, Hewitson, Ex. Butt. ii. *Pier.* pl. 6. fig. 38 (1861); ♀, iii. *Pier.* pl. 8. fig. 55 (1866).
Celebes. B.M.

2. Phrissura ægis.

♀. *Pieris ægis*, Felder, Wien. ent. Monats. v. p. 299. n. 6 (1861); Reise der Novara, Lep. ii. p. 175. n. 162, pl. 24. fig. 1 ("1865").
♂. *Pieris illana*, Felder, Wien. ent. Monats. vi. p. 287. n. 48 (1862).
Philippines. B.M.

Genus 9. Daptonura*, Butler,
Cat. Fabr. Diurn. Lep. p. 209 (1869).

1. Daptonura lycimnia.

Papilio lycimnia, Cramer, Pap. Exot. ii. pl. 105. figs. E, F (1779).
Papilio flippantha, Fabricius, Ent. Syst. 3, i. p. 202. n. 631 (1797).
Mylothris agrippina, Hübner, Verz. bek. Schmett. p. 91. n. 949 (1816).
Pará; Brazil. B.M.

2. Daptonura polyhymnia.

Pieris polyhymnia, Felder, Reise der Novara, Lep. ii. p. 170. n. 152 ("1865").
Bogota. B.M.
Perhaps only a yellow variety of *D. lycimnia*.

* This should be the spelling of the name; I originally, by sheer inadvertence, inserted the *o* as in the Greek original.

3. Daptonura eurymnia.

♂. *Pieris eurymnia*, Felder, Reise der Novara, Lep. ii. p. 170. n. 153 ("1865").
Venezuela. B.M.

4. Daptonura salacia.

Pieris salacia, Godart, Enc. Méth. ix. p. 144. n. 91 (1819).
Pieris vecticlusa, Butler, Proc. Zool. Soc. London, p. 456. n. 3, pl. 26. fig. 3 (1865).
Cuba. B.M.

5. Daptonura limnoria.

Pieris limnoria, Godart, Enc. Méth. ix. p. 144. n. 93 (1819); (*Mylothris*, L.) Hübner, Samml. exot. Schmett. iii. (1816–41).
Melete limnobia, Swainson, Zool. Ill. ii. pl. 79 (1833).
Brazil. B.M.

6. Daptonura pantoporia.

Mylothris pantoporia, Hübner, Samml. ex. Schmett. iii. (1816–41).
—— ? B.M.

7. Daptonura eubotea.

Pieris eubotea, Godart, Enc. Méth. ix. p. 144. n. 90 (1819).
? *Papilio cano-exalbidus*, Goeze, Beytr. i. p. 183. n. 85 (1779).
Peruvian Amazons. B.M.

8. Daptonura ælia.

Pieris ælia, Felder, Wien. ent. Monats. v. p. 82. n. 34 (1861).
Var.? *Pieris laria*, Felder, Reise der Novara, Lep. ii. p. 171. n. 155 ("1865").
Bolivia. B.M.

9. Daptonura leucadia.

Euterpe leucadia, Felder, Wien. ent. Monats. vi. p. 67. n. 8 (1862).
Rio Negro.
Closely allied to *D. ælia*.

10. Daptonura peruviana.

Pieris peruviana, Lucas, Rev. Zool. p. 327 (1852).
Id.? E. Peru. B.M.

11. Daptonura leucanthe.

Pieris leucanthe, Felder, Wien. ent. Monats. v. p. 82. n. 35 (1861).
Archidona; Cuenca; E. Peru. B.M.
Possibly a variation of *D. peruviana*.

12. Daptonura isandra.

Pieris isandra, Boisduval, Sp. Gén. Lép. i. p. 490. n. 79 (1836).
Brazil; Polochic valley, Nicaragua; Jamaica. B.M.

13. DAPTONURA? EVONIMA.

Pieris evonima, Boisduval. Sp. Gén. Lép. i. p. 493. n. 84 (1836).
Cuba.

Genus 10. BELENOIS, Hübner,
Verz. bek. Schmett. p. 92 (1816).

1. BELENOIS CALYPSO.

Papilio calypso, Drury, Ill. Ex. Ent. ii. pl. 17. figs. 3, 4 (1773).
Papilio nigronotatus, Goeze, Beytr. i. p. 182. n. 76 (1779).
Papilio retorta, Goeze, Beytr. i. p. 182. n. 78 (1779).
Papilio nigropictus, Goeze, Beytr. i. p. 183. n. 83 (1779).
Sierra Leone; Ashanti; Congo. B.M.

2. BELENOIS SABINA.

Pieris sabina, Felder, Reise Nov. Lep. ii. p. 167. n. 145 ("1865").
Sierra Leone. B.M.
Like a white *B. ianthe* on the upper surface.

3. BELENOIS IANTHE.

Pieris ianthe, E. Doubleday, Gray's Zool. Misc. p. 77 (1842).
Belenois ianthe, Butler, Lep. Exot. ii. pl. 34. fig. 8 (1872).
Sierra Leone. B.M.

4. BELENOIS RHENA.

Pieris rhena, Doubleday, Ann. & Mag. Nat. Hist. xvii. p. 24 (1846).
♂, Ashanti; ♀, W. Africa. B.M.

5. BELENOIS HEDYLE.

Papilio hedyle, Cramer, Pap. Exot. ii. pl. 186. figs. C, D (1779).
? *Papilio sordide-flavicans*, Goeze, Beytr. i. p. 182. n. 82 (1779).
Ashanti. B.M.

6. BELENOIS THEORA.

Pieris theora, E. Doubleday, Ann. & Mag. Nat. Hist. xvii. p. 25 (1846); Doubl. & Hew. Gen. Diurn. Lepid. pl. 6. fig. 4 (1847).

♂ var.? *Pieris subeida*, Felder, Reise Nov. Lep. ii. p. 174. n. 161 ("1865").
♂, Niger; ♀, Ashanti. B.M.

7. BELENOIS HELCIDA.

Pieris helcida, Boisduval, Faun. de Madag. p. 17. n. 1, pl. 2. figs. 1, 2 (1833).
Madagascar.

8. BELENOIS THYSA.

Pieris thysa, Hopffer, Ber. Verh. Ak. Berl. p. 639. n. 1 (1855); Peters's Reise, Zool. v. p. 349, pl. 21. figs. 7–10 (1862).

Pieris sabrata, E. Doubleday, Gen. Diurn. Lepid. p. 47. n. 62 (1847).
Pieris agathina, var. A., Trimen, Rhop. Ap. Austr. p. 29 (1862).
Congo. B.M.

9. BELENOIS MELDOLÆ, Butler, Proc. Zool. Soc. (1871).
Loanda. Coll. R. Meldola.

10. BELENOIS MATUTA.

Pieris matuta, E. Doubleday, Ann. & Mag. Nat. Hist. xx. p. 64 (1847).
Sierra Leone; Fernando Po. B.M.

11. BELENOIS LARIMA.

Pieris larima, Boisduval, Sp. Gén. Lép. i. p. 524. n. 126 (1836).
Congo. B.M.

12. BELENOIS PIGEA.

♀. *Pieris pigea*, Boisduval, Sp. Gén. Lép. i. p. 523. n. 124 (1836).
♂. *Pinacopteryx alba*, Wallengren, Lep. Rhop. Caffr. p. 10 (1857).
Belenois inana, Butler, Trans. Ent. Soc. London, p. 526. n. 1 (1870).
Zulu; Port Natal. ♂, ♀, B.M.

13. BELENOIS ORBONA.

Mylothris orbona, Hübner, Zutr. ex. Schmett. figs. 985, 986 (1832).
Africa. B.M.

14. BELENOIS SIMANA.

Pieris simana, Hopffer, Ber. Verh. Ak. Berl. p. 640. n. 13 (1855); Peters's Reise n. Mossamb. Zool. v. p. 354, pl. 23. figs. 3–6 (1862).
S. Africa. B.M.

15. BELENOIS CHARINA.

Pieris charina, Boisduval, Sp. Gén. Lep. i. p. 525. n. 128 (1836).
♀. *Pieris anactorie*, E. Doubleday, Gray's Zool. Miscell. p. 77 (1842).
♀. *Papilio nelo*, Bergsträsser, pl. 32. fig. 2; Herbst, Natursyst. Schmett. pl. 87. fig. 9.
Knysna; Port Natal; Zulu country, B.M.
As Mr. Doubleday hardly ever labelled his types, some of them (amongst which is that of *P. anactorie*) seem to have been turned out of the Collection as worn-out specimens; at any rate, they do not now exist there.

16. BELENOIS PHAOLA.

Pieris phaola, E. Doubleday, Ann. & Mag. Nat. Hist. xx. p. 63 (1847).
Dahomey.

17. Belenois hyoma.

Pieris hyoma, Boisduval. Sp. Gén. Lép. i. p. 508. n. 102 (1836).
E. Africa.

18. Belenois confusa, sp. n.

Pieris phileris, ♀, Boisduval, Faun. Lép. de Madag. pl. 2. fig. 5 (1833).
Madagascar.

19. Belenois eudoxia.

Papilio eudoxia, Drury, Ill. Ex. Ent. iii. pl. 32. figs. 1, 2 (1782).
Ashanti. B.M.

20. Belenois sylvia.

Papilio sylvia, Fabricius, Syst. Ent. p. 470. n. 115 (1775).
Papilio sylphia, Herbst, Natursyst. Schmett. v. p. 47. n. 21.
Sierra Leone. B.M.

21. Belenois cynis.

Pieris cynis, Hewitson, Ex. Butt. iii. *Pier.* pl. 8. fig. 54 (1866).
Malacca. B.M.

22. Belenois zochalia.

Pieris zochalia, Boisduval, Sp. Gén. Lép. i. p. 508. n. 100 (1832).
S. Africa; Knysna, Cape of Good Hope. B.M.

23. Belenois gidica.

Pieris gidica, Godart, Enc. Méth. ix. p. 131. n. 37 (1819).
Pinacopteryx doubledayii et *westwoodii*, Wallengren, Lep. Rhop. Caffr. pp. 8, 9 (1853).
Port Natal; Plettenberg Bay; Zulu Country; Knysna. B.M.

24. Belenois mesentina.

Papilio mesentina, Cramer, Pap. Exot. iii. pl. 270. figs. A, B (1782).
Papilio avrota, Fabricius, Ent. Syst. iii. p. 197. n. 614 (1793).
Punjaub; Barrackpore; Bengal; Benares; Ceylon. B.M.

25. Belenois augusta.

Papilio augusta, Olivier, Voy. dans l'Emp. Ott. Atlas, pl. 33. figs. 3*a*, *b* (1801).
Asia Minor.
Possibly a variety of *B. mesentina*.

26. Belenois teutonia.

Papilio teutonia, Fabricius, Syst. Ent. p. 474. n. 137 (1775); Sulzer, Gesch. Ins. pl. 15. fig. 9 (1776).
New Holland; Queensland. B.M.

27. Belenois clytie.

Papilio clytie, Donovan, Ins. New Holland, pl. 19. fig. 2 (1805).
Papilio coronea, ♀, Herbst, Natursyst. Schmett. pl. 98. fig. 89.
N. Australia. B.M.

28. Belenois niscia.

Pieris niscia, McLeay, in King's Surv. Austr. ii. App. p. 459. n. 138 (1827).
New Holland; West Australia. B.M.

29. Belenois javæ.

Papilio javæ, Sparrmann, Amœn. Acad. vii. p. 504. n. 1 (1767).
Papilio coronea, Cramer, Pap. Exot. i. pl. 68. figs. B, C (1779).
Papilio deiopeia, Donovan, Ins. New Holl. pl. 21. fig. 2 (1805).
Java; Bali; Flores; Amboina. B.M.

30. Belenois perictione.

Pieris perictione, Felder, Reise Nov. Lep. ii. p. 168. n. 149 ("1865").
Aru Islands.

31. Belenois creona.

Papilio creona, Cramer, Pap. Exot. i. pl. 95. figs. C–F (1779).
Var. *Papilio helcita** (part), Fabricius, Syst. Ent. p. 475. n. 141 (1775).
Papilio cneora, Fabricius, Ent. Syst. iii. p. 191. n. 594 (1797).
Colias ernestius, Laporte, Bull. Soc. Linn. Bord. iv. (18—?).
Senegal. B.M.
Var. *Papilio severina*, Cramer, Pap. Exot. iv. pl. 338. figs. G, H (1782).
Pieris agrippina, Felder, Reise Nov. Lep. ii. p. 173. n. 159 (1865).
Port Natal; Zulu country. B.M.
Var. *Pieris boguensis*, Felder, Reise Nov. Lep. ii. p. 173. n. 160 (1865).
Pieris elisa, Vollenhoven, in Pollen & Van Dam's Faun. Madag. v. p. 12. n. 9, pl. 2. fig. 3 (1869).
White Nile. B.M.

32. Belenois syrinx.

Pinacopteryx syrinx, Wallengren, Wien. ent. Mon. iv. p. 34. n. 4 (1860).
S. Africa.
Belongs to the *Creona* group.

33. Belenois scyllaria.

Pieris scyllaria, McLeay, King's Surv. Austr. ii. App. p. 459. n. 139 (1827).
Pieris lanassa, Boisduval, Sp. Gén. Lép. i. p. 477. n. 57 (1836).

* Also of Goeze's Beyträge, i. p. 147. n. 94 (1779).

Var. *Pieris nabis*, Lucas, Rev. Zool. p. 326 (1852).
Pieris perithea, Felder, Reise Nov. Lep. ii. p. 169. n. 150 (1865).
N. Australia; Port Essington; Cape York. B.M.

34. BELENOIS PERICLEA.

Pieris periclea, Felder Reise Nov. Lep. ii. p. 169. n. 151 ("1865"); Herrich-Schäffer, Stett. ent. Zeit. p. 76. n. 45, pl. 1. fig. 4 (1869).
Aneiteum, New Hebrides; N.W. Australia. B.M.

35. BELENOIS PERIMALE.

Papilio perimale, Donovan, Ins. New Holl. pl. 20. fig. 1 (1805).
Var.? *Pieris narses*, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 333. n. 13, pl. 6. fig. 3 (1867).
Australia.

36. BELENOIS BOISDUVALIANA.

Pieris boisduvaliana, Felder, Wien. ent. Mon. vi. p. 287. n. 47 (1862); Reise Nov. Lep. ii. p. 168. n. 147, pl. 24. fig. 8 ("1865").
Pieris nephele, ♀, Felder, Wien. ent. Mon. v. p. 299. n. 8 (1861).
Manilla. B.M.

37. BELENOIS RACHEL.

Pieris rachel, Boisduval, Sp. Gén. Lép. i. p. 469. n. 46 (1836).
Pieris wallaceana, Felder, Reise Nov. Lep. ii. p. 168. n. 148 (1865).
Waigiou. B.M.

38. BELENOIS PERISTHENE.

Pieris peristhene, Boisduval, Bull. Soc. Ent. France, p. 155. n. 4 (1859).
New Caledonia, New Ireland, and Aneiteum (New Hebrides). B.M.

39. BELENOIS PITYS.

Pieris pitys, Godart, Enc. Méth. ix. p. 134. n. 48 (1819); Lucas, Lep. Ex. pl. 29. fig. 1 (1835).
Java; Timor. B.M.

40. BELENOIS MENTES.

Pieris mentes, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 332. n. 11 (1867).
Lombock. B.M.

41. BELENOIS AFFINIS.

Pieris affinis, Vollenhoven, Mon. Pier. p. 40. n. 53. pl. 5. fig. 2 (1865).
Celebes. B.M.

42. BELENOIS? ERASTUS.

Pieris erastus, Hewitson, Ex. Butt. iii. *Pier.* pl. 8. fig. 51 (1866).
Gaboon.

43. BELENOIS? ABYSSINICA.

Pieris abyssinica, Lucas, Rev. Zool. p. 328 (1852).
Abyssinia.

Genus 11. PONTIA, Fabricius,
Illiger's Mag. vi. p. 283 (1807).

1. PONTIA CRATÆGI.

Papilio cratægi, Linnæus, Faun. Suec. p. 269. n. 1034 (1761).
Papilio nigronervosus, Retz. Gen. Spec. Ins. p. 30. n. 2 (1783).
England; France; Germany; Syria; N. Japan. B.M.

2. PONTIA HIPPIA.

Pieris hippia, Bremer, Bull. Acad. Pét. iii. p. 464 (1861); Lep. Ost-Sibir. p. 7. n. 12, pl. 3. fig. 1 (1864).
Leuconia cratægi, var. *cratægoides*, Lucas, Ann. Soc. Ent. France, p. 503, pl. 11. fig. 11 (1866).
China.

3. PONTIA SORACTA.

Aporia soracta, Moore, Cat. Lep. East-Ind. Comp. 1, p. 83. n. 170 (1857).
Himalayas. B.M.

4. PONTIA MENAPIA.

Pieris menapia, Felder, Wien. ent. Mon. iii. p. 271. n. 18 (1859); Reise der Nov. Lep. ii. p. 181. n. 172, pl. 25. fig. 7 ("1865").
Pieris tau, Scudder, Proc. Boston Nat. Hist. Soc. viii. p. 183 (1861).
Pieris ninonia, Boisduval, Lép. Cal. p. 38. n. 5 (1869).
British Colombia, West Coast of America. B.M.

5. PONTIA TERLOOII.

Neophasia terlooii, Behr, Trans. Am. Ent. Soc. p. 304 (1869).
California.

6. PONTIA NOTHA.

Euterpe notha, Lucas in Guérin's Rev. Zool. p. 195 (1852).
Venezuela. B.M.

7. PONTIA PIERIDOIDES.

Euterpe pieridoides, Felder, Reise der Novara, ii. p. 158. n. 126 ("1865").
Bogotá (*Lindig*), *Felder*.
"In marking and coloration, especially on the underside of the hind wings, this species strikingly calls to mind *Pieris locusta*, Felder, from Bogotá."

8. PONTIA CORCYRA.

Euterpe corcyra, Felder, W. e. Monatschr. iii. p. 327 (1859); Reise der Novara, ii. p. 159. n. 127, pl. 23. fig. 8 ("1865").
E. Peru. B.M.

9. Pontia calymnia.

Euterpe calymnia, Felder, Wien. ent. Monats. vi. p. 67. n. 7 (1862); Reise der Novara, Lep. ii. p. 171. n. 154, pl. 23. fig. 7 ("1865").

Rio Negro.

10. Pontia remba.

Pieris remba, Moore, Cat. Lep. E. I. C. i. p. 75. n. 147 (1857).

Var. *Pieris amba*, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 340. n. 36 (1867).

N. India; Canara; Ceylon. B.M.

11. Pontia nadina.

Pieris nadina, Lucas, Rev. Zool. p. 333 (1852).

Id. var.? *Pieris nama*, Moore, Cat. Lep. Mus. E. I. C. i. p. 76. n. 148 (1857); Proc. Zool. Soc. p. 102, pl. 44. figs. 1, 2 (1857).

Darjeeling; Silhet; N. Australia. B.M.

12. Pontia eperia.

Pieris eperia, Boisduval, Sp. Gén. Lép. i. p. 470. n. 48 (1836).

Celebes. B.M.

13. Pontia nerissa.

Papilio nerissa, Fabricius, Syst. Ent. p. 471. n. 123 (1775).
Papilio amasene, Cramer, Pap. Exot. i. pl. 44. fig. A (1776).
Papilio coronis, Cramer, Pap. Exot. i. pl. 44. figs. B, C (1776).
Papilio coronnis (sic), Herbst, Natursyst. Schmett. v. p. 88. n. 25.

Hong-Kong; Moulmein; Nepal. B.M.

14. Pontia corva.

Pieris corva, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 339. n. 32 (1867).
Pieris coronis, var. *A*, Boisduval, Sp. Gén. Lép. i. p. 472 (1836).

Java; Sumatra; Baly Island. B.M.

15 Pontia phryne.

Papilio phryne, Fabricius, Syst. Ent. p. 473. n. 131 (1775).
Papilio evagete, Cramer, Pap. Exot. iii. pl. 221. figs. F, G (1782).

Canara; Landoor; Nepal. B.M.

16. Pontia zeuxippe.

Papilio zeuxippe, Cramer, Pap. Exot. iv. pl. 362. figs. E, F (1782).
Papilio cassida, Fabricius, Ent. Syst. Suppl. p. 427 (1798).
Pieris hira, Moore, Proc. Zool. Soc. p. 490. n. 22, pl. 31. fig. 17 (1865).

Var. *Pieris copia*, Wallace, Trans. Ent. Soc. 3, vol. iv. p. 340. n. 35 (1867).

E. India, Bombay; Malwa, N. India. B.M.

17. PONTIA TEMENA.

Pieris temena, Hewitson, Ex. Butt. ii. *Pier.* pl. 3. fig. 19 (1861).
Lombock. B.M.

18. PONTIA TAMAR.

Pieris tamar, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 337. n. 25, pl. 6. fig. 2 (1867).
Baly Island.
Near *P. temena*.

19. PONTIA TIMNATHA.

Pieris timnatha, Hewitson, Ex. Butt. iii. *Pier.* pl. 7. figs. 47, 48 (1862).
Tondano, Celebes. B.M.

20. PONTIA LÆTA.

Pieris læta, Hewitson, Ex. Butt. iii. *Pier.* pl. 7. figs. 45, 46 (1862).
Timor.

21. PONTIA PACTOLICA.

Pieris pactolicus, Butler, Proc. Zool. Soc. p. 455. n. 1, pl. 26. fig. 1 (1865).
Borneo. B.M.

22. PONTIA CLEMANTHE.

Pieris clemanthe, Doubleday & Hewitson, Gen. Diurn. Lepid. pl. 6. fig. 3 (1847).
Siam. B.M.

23. PONTIA LEA.

Pieris lea, E. Doubleday, Ann. & Mag. Nat. Hist. xvii. p. 23 (1846).
? *Pieris amalia* ♀, Vollenhoven, Mon. Pier. p. 23 (1865).
Sarawak. B.M.

24. PONTIA AMALIA.

Pieris amalia, Vollenhoven, Mon. Pier. p. 23. n. 28, pl. 3. fig. 6 (1865).
Singapore; Moulmein. B.M.

25. PONTIA LICEA.

Papilio licea, Fabricius, Mant. Ins. ii. p. 20. n. 210 (1787).
East Indies?
Seems to come near *P. amalia*.

26. PONTIA JAEL.

Pieris jael, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 335. n. 20 (1867).
Bouru.

27. PONTIA NAOMI.

Pieris naomi, Wallace, Trans. Ent. Soc. London, 3, vol. iv. p. 336. n. 23 (1867).
Lombock. B.M.

28. PONTIA HESTER.

Pieris hester, Vollenhoven, Mon. Pier. p. 24. n. 29, pl. 4. fig. 1 (1865).
Papua.

29. PONTIA JUDITH.

Papilio judith, Fabricius, Mant. Ins. ii. p. 22. n. 230 (1787); Donovan, Ins. Ind. pl. 27. fig. 2 (1800).
Java. B.M.

30. PONTIA OLGA.

Pontia olga, Eschscholtz, Kotzeb. Reise, iii. p. 214, pl. 9. figs. 21*a*, 21*b* (1821).
Philippines; Hong-Kong. B.M.

31. PONTIA ASPASIA.

Papilio aspasia, Stoll, Suppl. Cramer's Pap. Ex. pl. 33. figs. 3, 3 c (1790).
Pieris asterope, Godart, Enc. Méth. ix. p. 154. n. 125 (1819).
Amboina; Ceram. B.M.

32. PONTIA EMMA.

Pieris emma, Vollenhoven, Mon. Pier. p. 24. n. 30, pl. 4. fig. 2 (1865).
Var. Philippine islands. B.M.
Nearly allied to *P. aspasia*.

Genus 12. METAPORIA, Butler.
Cist. Ent. iii. pp. 38 & 51 (1870).

1. METAPORIA PHRYXE.

Pieris phryxe, Boisduval, Sp. Gén. Lép. i. p. 446. n. 12 (1836); Blanchard in Jacquem. Voy. Inde, iv. Ins. p. 16. n. 6, pl. 2. fig. 1 (1844).
N. India. B.M.

2. METAPORIA AGATHON.

Pieris agathon, G. R. Gray, Zool. Misc. p. 33 (1831); Lep. Ins. Nepal, p. 8, pl. 8. fig. 1 (1846).
Nepal; N. India. B.M.

3. METAPORIA NABELLICA.

Pieris nabellica, Boisduval, Sp. Gén. Lép. i. p. 509. n. 104 (1836).
Himalayas.

Genus 13. Synchloë, Hübner.
Verz. bek. Schmett. p. 94 (1816).

1. Synchloë daplidice.

Papilio daplidice, Linnæus, Syst. Nat. i. p. 760. n. 77 (1766); Hübner, Eur. Schm. i. figs. 414, 415 (1798–1803).
Papilio edusa, Fabricius, Gen. Ins. p. 255 (1777).

Var. *Papilio bellidice*, Brahm, Ill. Mag. iv. p. 362 (1805).
Papilio belemida, Hübner, Eur. Schm. i. fig. 931–4 (1827–1841).

Var. *Papilio raphani* (part), Esper, Eur. Schm. i. ii. pl. 84. fig. 3 (1783).
Germany; Sicily; Spain; Andalusia; Cashmere; Syria. B.M.

2. Synchloë glauconome.

Pontia glauconome, Klug, Symb. Phys. pl. 7. figs. 18, 19 (1829).
Arabia; Egypt.
Allied to *S. daplidice*.

3. Synchloë callidice.

Papilio callidice, Esper, Eur. Schm. i. ii. pl. 115. figs. 2, 3 (1777).
Pieris kalora, Moore, Proc. Zool. Soc. p. 489. n. 18, pl. 31. fig. 15 (1865).

Var. *Pieris chrysidice*, Herrich-Schäffer, Eur. Schm. i. figs. 200–203 (1844).
Europe. B.M.

4. Synchloë protodice.

Pieris protodice, Boisduval & Leconte, Lép. Am. Sept. p. 45, pl. 17. figs. 1–3 (1833).
Ohio; British Columbia; Mexico. B.M.

5. Synchloë hellica.

Papilio hellica, Linnæus, Syst. Nat. i. ii. p. 760. n. 71 (1766).
Papilio helice, Linn. Mus. Ulr. p. 243 (1764).
Papilio daplidice, Cramer, Pap. Exot. ii. pl. 171. figs. C, D (1779).
Papilio raphani, Esper, Eur. Schm. i. ii. pl. 123. figs. 3, 4 (1806?).
Cape of Good Hope; Knysna; Interior of S. Africa. B.M.

6. Synchloë chloridice.

Papilio chloridice, Hübner, Eur. Schm. i. figs. 712, 713 (1803–18).
Papilio daplidice, Esper, Eur. Schm. i. ii. pl. 90. fig. 1 (1784).
Russia. B.M.

7. Sychloë? leucodice.

Pontia leucodice, Eversmann, Bull. Mosc. p. 541, pl. 7. figs. 2 *a*, *b* (1843).
Siberia.
Somewhat resembles the species of the genus *Tatochila*.

8. Synchloë sisymbrii.

Pieris sisymbrii, Boisduval, Ann. Soc. Ent. France, p. 284 (1852).
California.
Links the *Napi* and *Daplidice* groups.

9. Synchloë? canace.

Pieris canace, Edwards, Trans. Am. Ent. Soc. (1870).
California.

10. Synchloë hulda.

Pieris hulda, Edwards, Trans. Am. Ent. Soc. ii. p. 370 (1870).
Kodiak.

11. Synchloë ajaka.

Pieris ajaka, Moore, Proc. Zool. Soc. p. 490. n. 21, pl. 31. fig. 16 (1865).
Kunawur (*Lang*). B.M.

12. Synchloë napi.

Papilio napi, Linnæus, Faun. Suec. p. 271. n. 1037 (1761).

Var. *Papilio bryoniæ*, Ochsenheimer, Eur. Schm. i. ii. p. 151 (1808).

Papilio napi, Esper, Eur. Schm. i. ii. pl. 64. figs. 3–5 (1783).

Var. *Papilio napææ*, Esper, Eur. Schm. i. ii. pl. 116. fig. 5 (1800?).

Var. *Pontia sabellicæ*, Steph. Ill. Haust. i. p. 21, pl. 3. figs. 3, 4 (1827).
Austria; Germany; Lapland. B.M.

13. Synchloë nasturtii.

Pieris nasturtii, Edwards, Proc. Ent. Soc. Philad. ii. p. 501 (1864).
California.

14. Synchloë virginiensis.

Pieris virginiensis, Edwards, Trans. Am. Ent. Soc. p. 13 (1870).
United States.

15. Synchloë oleracea.

Pontia oleracea, Harris, New Engl. Farmer, viii. p. 402 (1829).

Var. *Pieris cruciferarum*, Boisduval, Sp. Gén. Lép. i. p. 519. n. 119 (1836).

Var. *Pontia casta*, Kirby, Faun. Bor. Am. iv. p. 288, pl. 3. fig. 1 (1837).
Newfoundland; Nova Scotia; Hudson's Bay; Vancouver Island; Canada West. B.M.

Var. *S. cruciferarum*. Canada West. B.M.

16. Synchloë frigida.

Pieris frigida, Scudder, Proc. Bost. Nat. Hist. Soc. viii. p. 181 (1861).
Pieris oleracea (part), Boisduval, Sp. Gén. Lép. i. p. 518. n. 117 (1836).
Labrador.

17. Synchloë venosa.

Pieris venosa, Scudder, Proc. Bost. Nat. Hist. Soc. viii. p. 182 (1861).
Pieris nasturtii, Boisduval, Lép. Cal. p. 38. n. 7 (1869).
California.

18. Synchloë marginalis.

Pieris marginalis, Scudder, Proc. Bost. Nat. Hist. Soc. viii. p. 183 (1861).
California.

19. Synchloë pallida.

Pieris pallida, Scudder, Proc. Bost. Nat. Hist. Soc. viii. p. 183 (1861).
Pieris yreka, Reakirt, Proc. Acad. Nat. Sci. Philad. p. 238. n. 1 (1866).
Pieris iberidis, Boisduval, Lép. Cal. p. 39. n. 9 (1869).
California.

20. Synchloë occidentalis.

Pieris occidentalis, Reakirt, Proc. Ent. Soc. Philad. vi. p. 133 (1866).
Colorado.

21. Synchloë vernalis.

Pieris vernalis, Edwards, Proc. Ent. Soc. Philad. ii. p. 105 (1864).
New Jersey.

22. Synchloë melete.

Pieris melete, Ménétriés, Cat. Mus. Petr. Lep. ii. p. 113, pl. 10. figs. 1, 2 (1857).
Japan. B.M.

23. Sycnhloë brassicoides.

Pieris brassicoides, Guérin, Lef. Voy. Abyss. vi. p. 365, pl. 9. figs. 3–6 (1849).
Abyssinia. B.M.
We received this under the name of *P. kafta*; but I cannot discover that it has been anywhere described under this name.

24. SYNCHLOË CHEIRANTHI.

Catophaga cheiranthi, Hübner, Samml. ex. Schm. ii. pl. 124 (1816–36).
Teneriffe. B.M.

25. SYNCHLOË NEPALENSIS.

Pieris brassicæ, var. *nepalensis*, Gray, Lep. Ins. Nepal. pl. 6. figs. 1, 3 (1846).
Punjaub; Bhotan; E. India; Madeira. B.M.

26. SYNCHLOË BRASSICÆ.

Papilio brassicæ, Linnæus, Faun. Suec. p. 269. n. 1035 (1761).

Var. *Pontia chariclea*, Stephens, Ill. Haust. i. p. 17, pl. 3. figs. 1, 2 (1827).
Germany; France; Syria. B.M.
We have a female specimen labelled St. Domingo; but this must, I think, be an error.

27. SYNCHLOË CRUCIVORA.

Pieris crucivora, Boisduval, Sp. Gén. Lép. i. p. 522 (1836).
Hakodadi; Nagasaki; Shang-hae. B.M.

28. SYNCHLOË ERGANE.

Papilio ergane, Hübner, Eur. Schmett. i. figs. 904–7 (1827?).
Pontia narcæa, Freyer, Neuere Beiträge, i. pl. 43. fig. 3 (1828).
Pieris rapæ, var., Boisduval, Sp. Gén. Lép. i. p. 520 (1836).

Var. *Pontia mannii*, Mayer, Stett. ent. Zeit. p. 151 (1851).
Turkey. B.M.

29. SYNCHLOË KRUEPERI.

Pieris krueperi, Staudinger, Wien. ent. Mon. iv. p. 19 (1860); Mill. Icon. iv. p. 259, pl. 1. figs. 3–5 (1863).

Var. *Pieris krueperi*, var. *vernalis*, Staud. Hor. Soc. Ent. Ross. p. 34 (1870).
Greece.
Intermediate between *P. rapæ* and *brassicæ*.

30. SYNCHLOË? AGLAOPE.

Pieris aglaope, Motschulsky, Etudes Entom. ix. p. 28 (1860).
Japan.

31. SYNCHLOË RAPÆ.

Pieris rapæ, Linnæus, Faun. Suec. p. 270. n. 1036 (1761).

Var. *Pontia metra*, Steph. Ill. Haust. i. p. 19 (1827).

Var. *Pieris rapæ*, var. *leucotera*, Stef. Bull. Ent. Soc. Ital. i. p. 147 (1869).
Italy; Germany; Syria; Japan. B.M.

32. Synchloë castoria.

Pieris castoria, Reakirt, Proc. Acad. Nat. Sci. Philad. p. 238. n. 2 (1866).
Pieris resedæ, Boisduval, Lép. Cal. p. 39. n. 8 (1869).
California.
Allied to *S. rapæ*.

33. Synchloë canidia.

Papilio canidia, Sparrman, Amœn. Acad. vii. p. 504, note m. (1768).
Papilio gliciria, Cramer, Pap. Exot. ii. pl. 171. figs. E, F (1779).
Papilio liciria, Herbst, Natursyst. Schmett. v. p. 63. n. 2.
Pieris glaphyra, Godart, Enc. Méth. ix. p. 160. n. 140 (1819).
Var. ♀ ? *Papilio acaste*, Linnæus, Mus. Ulr. p. 250 (1764).
Punjaub; Silhet; China; Hong-Kong; Amoy. B.M.

34. Synchloë monuste.

Papilio monuste, Linnæus, Mus. Lud. Ulr. p. 237 (1864).
Papilio phileta, Fabricius, Syst. Ent. p. 471. n. 119 (1775).
Papilio monusta (sic), Herbst, Natursyst. Schmett. pl. 88. fig. 6.
Mylothris hippomonuste, Hübner, Verz. bek. Schm. p. 91. n. 952 (1816).
Pieris orseis, Godart, Enc. Méth. ix. p. 141. n. 78 (1819).
Pontia feronia, Stephens, Ill. Haust. i. p. 149 (1828).
Var. *Papilio albusta*, Sepp, Surin. Vlind. iii. pl. 141 (1855).
Pieris mandela, Felder, Wien. ent. Mon. v. p. 80. n. 30 (1861).
Pernambuco; Brazil. B.M.

35. Synchloë suasa.

Pieris suasa, Boisduval, Sp. Gén. Lép. i. p. 549. n. 160 (1836).
Peru. B.M.
Possibly a melanistic form of *S. monuste*.

36. Synchloë joppe.

Pieris joppe, Boisduval, Sp. Gén. Lép. i. p. 495. n. 87 (1836); Lucas in Ramon de la Sagra's Hist. Cuba, vii. p. 491, pl. 15. figs. 2, 2 *a* (1857).
Jamaica. B.M.
Allied to *S. monuste*.

37. Synchloë cleomes.

Pieris cleomes, Boisduval & Leconte, Lép. Am. Sept. p. 43, pl. 16 (1833).
?*Pieris vallei*, Boisduval, Sp. Gén. Lép. i. p. 494. n. 86 (1836); Lucas in Ramon de la Sagra's Hist. Cuba, vii. p. 491, pl. 1. figs. 1, 1 *a* (1857).
Honduras; Nicaragua; Portorico. B.M.

38. SYNCHLOË VIRGINIA.

Pieris virginia, Godart, Enc. Méth. ix. p. 141. n. 81 (1819).
Mylothris hemithea, Hübner, Zuträge ex. Schmett. figs. 693, 694 (1832).
Venezuela; West Indies. B.M.

Genus 14. TATOCHILA, Butler.
Cist. Ent. iii. pp. 38 & 51 (1870).

1. TATOCHILA AUTODICE.

Synchloë autodice, Hübner, Samml. ex. Schmett. ii. pl. 127 (1816–36).
Chili; Bolivia. B.M.

2. TATOCHILA THEODICE.

Pieris theodice, Boisduval, Voy. de l'Astr. Lép. p. 51. n. 11 (1832); Gay's Faun. Chil. vii. p. 12, pl. 1. figs. 1 *a*, *b* (1852).
Peru. B.M.

3. TATOCHILA MICRODICE.

Pieris microdice, Blanchard, Gay's Faun. Chil. p. 14 (1852).
Chili.

4. TATOCHILA MERCEDIS.

Pontia mercedis, Eschscholtz, Kotzeb. Reise, iii. p. 215, pl. 9. figs. 22 *a*, *b* (1821).
Chili; Peru. B.M.

5. TATOCHILA DEMODICE.

Pieris demodice, Blanchard, Gay's Faun. Chil. p. 13 (1852).
Sandy Point; Port Famine. B.M.

6. TATOCHILA XANTHODICE.

Pieris xanthodice, Lucas, Rev. Zool. p. 337 (1852).
Var. ? *Pieris polydice*, Blanchard, Gay's Faun. Chil. p. 12 (1852).
Quito. B.M.

Genus 15. HERPÆNIA, Butler.
Cist. Ent. iii. pp. 38 & 52 (1870).

1. HERPÆNIA ERIPHIA.

Pieris eriphia, Godart, Enc. Méth. ix. p. 157. n. 134 (1819); Lucas, Lép. Exot. pl. 28. fig. 2 (1835).
Pontia tritogenia, Klug, Symb. Phys. pl. 7. figs. 18, 19 (1829).
Congo. B.M.

P.S. Several species of *Pierides* from Costa Rica have been described in the fourth part of 'Cistula Entomologica' for January 1872, subsequently to the reading of this paper.

2. Notes on the Raptorial Birds of India. By A. Anderson, F.Z.S.—Part II.*

[Received January 4, 1872.]

29. Aquila fulvescens, Gray. (The Indian Tawny Eagle.)

Met with everywhere. In some places almost abundant, as well as a nuisance, from the clanging noise it makes when depriving other birds of their food. The habits of this Eagle have been well described by Jerdon; and the bird is probably too well known to require special notice. I examined several nests during the season, and invariably found only two eggs. They vary considerably in size, shape, and coloration; but on the whole they are poorly marked. January and February is the most general time for this Eagle to lay; but I came across some nests early in November. These birds had evidently built too soon, and used to sit mopingly close to their nest or on a neighbouring tree, as if watching their homestead, patiently waiting their appointed time.

The Wokab is partial to certain trees for the site of its nest; but I have found its predilection in this respect to be regulated by the abundance or scarcity of the trees in question. In the Cawnpore district they almost invariably build on solitary peepul trees (*Ficus religiosa*). In the Futtehgurh and Mynpoory districts, where the seesso (*Dalbergia seesoo*) grows to so gigantic a size, the preference is apparently given to them. Higher up the Doab, where the country assumes somewhat of a desert character, I found them building on thorny acacias. On one occasion I found a nest on a babool, which was certainly not more than fifteen feet high—a mere apology for a tree.

In November, 1867, I got a pair of abnormally small eggs, without the faintest indication of any colouring-matter (the contents of an unusually small nest, which was situated at the very top of a perpendicular branch of a mango), shooting one of the parent birds. This tree was one of a straggling group, close to the Martinière College at Lucknow; and, in proof of the boldness of this Eagle, I may mention that an enormous camp was formed under these very trees, awaiting the triumphal entry of the Viceroy into the capital of Oudh. I have since thought that this nest belonged *rightfully* either to *Milvus govinda* or to *Haliastur indus*, both of which species were very abundant there. When encamped at the pretty little station of Mynpoory in January last, a pair of Wokabs became excessively troublesome, carrying off every thing they could find, and robbing the more legitimate camp-scavengers, Kites and Crows, of every morsel they picked up. I was not long in finding their nest, an enormous structure, on the topmost branches of a seesoo, which was visible nearly a mile off, as at this season of the year the tree was devoid of *every green leaf*. The nest contained two half-grown eaglets, which were most tenderly nurtured by their parents,

* For Part I., see P. Z. S. 1871. p. 675.

judging from the frequency of their visits and the pugnacious way in which they attacked every bird that unconsciously approached within sight, no matter how far off. During one of my visits to the tree, I saw both the birds in hot pursuit of a Jugger Falcon that was flying away with a Pigeon. Another day I wounded a *Poliornis teesa*, which flew away dangling both legs. Simultaneously with my shot out flew one of these Wokabs, and pursued the wounded Buzzard, in the vain hope of becoming possessed of its prey! The Eagle very soon overtook the unfortunate bird, flying round it several times by way of inspection, and when satisfied that no booty was forthcoming, it returned to the nest after two or three rapid gyrations.

As mentioned by Jerdon, the Wokab subsists to a great extent by robbing other birds of prey of their earnings. The stomach of one I examined contained a large Field-Rat (*Gerbillus indicus*); the head and shoulders had been swallowed whole; and the tail alone measured eight inches long. Not long ago I shot one in the act of eating a Wild Pigeon (*Columba intermedia*), which must have been caught out of a flock of several thousands which were settling on a few solitary trees for the purpose of roosting.

I have said that probably no two birds approach each other more in *some* phases of plumage than do the Indian Tawny (*A. fulvescens*) and the European Tawny (*A. nævioides*) Eagles. But a remarkable characteristic in these two birds is, that their *adult* livery is assumed in reverse ratio to each other. *Aquila fulvescens* gets paler as it advances in age; and I have specimens of a uniform cream-colour, showing every signs of age, very like the second figure of *Aquila nævioides* in 'The Ibis' for 1865, page 166. The latter, *per contra*, is pale buff when immature, and gradually assumes a rich chocolate-brown when fully adult. There is no doubt, however, that *A. fulvescens* might be mistaken at a distance, either in its dark brown or pale buff stage for *A. nævioides*; and many a one I have shot in the hope of finding a specimen of the latter bird.

That the Wokab can be mistaken for something even better than the *A. nævioides* is proved by the sequel; for, since the first portion of these "Notes" was written, I shot a dark-looking bird off a telegraph-post, on the 28th of September last, and found myself in possession of a beautifully spotted (immature) female specimen of that somewhat mystical bird *Aquila hastata*, the first example I had ever seen in the flesh.

30. AQUILA HASTATA, Less. (The Long-legged Eagle.)

I did not anticipate the gratification of being able to include this rare and interesting bird in the present paper when I first undertook it, a gratification which has been very considerably increased by my being already in a position to furnish Messrs. Gurney and Tristram with specimens of my own shooting. As I believe this Eagle is not at present represented in any of our British museums, and as the author of 'Rough Notes' alludes to it as a "doubtful species" *, I

* Rough Notes, pt. i. p. 181.

trust no time will now be lost in having *Aquila hastata* figured, so as to enable him to speak for himself!

I have been extremely fortunate in procuring a good series of this *desideratissimum* of all Indian Eagles, as my collection already contains five specimens—representing both sexes, as also several phases of plumage.

No one that has ever seen this handsome little Eagle in the flesh could ever dispute its distinctness from both *Aquila nævia* and *A. fulvescens*. *Structurally* it has its affinities with the former, as the nostril is *round*, though smaller and more circular, and it has the same soft, silky plumage. The *fully adult* bird *might* be mistaken for a *pale, spotless A. nævia*; but the feeble beak, slender tarsi, length of wings, which generally *exceed the tail*, to say nothing of the comparatively small size of the whole bird (if the sex has been determined), are more than sufficient to separate it at a glance. The *immature* bird can never be mistaken for *A. nævia*, as the *minute* white or fulvous dots on the bend of the wing, which are *confined to the wing-coverts, chiefly near the carpal joint*, and the pale fawn colour of the under wing-coverts, together with the above characteristics, distinguish it at once. Still less can I understand how it could be confounded with *A. fulvescens*; for, leaving alone the question of plumage, it is *structurally* distinct. Had Mr. Hume examined the *nostril* of the disputed bird in Col. Tytler's museum, he would have noticed that, although it was "*vastly like A. fulvescens*," the nostril alone was sufficient to separate it from that bird.

In its habits *Aquila hastata* is equally distinct from either of the above species. It affects open, alluvial country, is never found (according to my present experience), like the Wokab, in dry, arid plains, nor in the vicinity of stagnant, marshy pools, like the Spotted Eagle. All my specimens have been procured (by me) in low, open country in the vicinity of rivers, which was more or less submerged during the rainy season, and was only then being ploughed for the first time since the cold weather had set in. I never once saw a *single A. nævia* in the same country as where I met with *A. hastata*, although the Wokab was abundant.

My best collecting-ground for the Long-legged Eagle (decidedly a misnomer, as the measurements will prove) was between the Ganges and Ramgunga, in the Futtehgurh district. The country between these two rivers is low, and is subject to inundation more or less every year. This season, owing to the unusually heavy rains, the two rivers were one continuous sheet of water for two months, submerging a strip of country from six to eight miles in breadth. It was here that I got my first specimen, seated on a telegraph-post within shot of the road, on the 28th of September, before the waters had fairly subsided.

Since procuring the above specimens, I have explored the most likely ground in the Etawah and Mynpoory districts; and although I have met with *Aquila fulvescens* everywhere, and *Aquila nævia* in all suitable ground, neither Mr. Brooks nor I have as yet succeeded in adding *Aquila hastata* to the avifauna of either of these districts.

The natural conclusion we have arrived at is, that this part of the country is too dry. I did indulge the hope that, like its ally the Spotted Eagle, it too would be a marsh-loving bird; but I think it pretty safe to conclude that the two Eagles do not affect the same kind of ground. Time and further research, however, is necessary before this point can be authoritatively settled; and it is just possible, now that we know *A. hastata*, that the bird may yet occur as a rare straggler near the jheels as the weather gets warmer.

It is a matter of regret that we are still ignorant as to the food of this Eagle; for the craws of my specimens did not contain the slightest vestige of any thing, notwithstanding I made careful *postmortems*. In the stomach of the first bird I found an intestinal worm 3½ inches long, which, together with all the sterna, has been preserved. They were all shot about two hours after sunrise, by which time Raptores in this country have generally made their morning meal. It is, however, very probable that grubs and earthworms may constitute a good portion of their diet, and hence perhaps the reason they affect newly ploughed lands.

There are two more points connected with this bird which I should mention—namely, its heavy, slow, Kite-like flight, and its excessive tameness. Had this Eagle been in the least degree wary, I should never have succeeded in securing a single specimen, owing to the exposed trees they sit on, and the entire absence of any cover. I saw only five birds, and shot them all, at a distance of 20 to 25 yards; and I may add that no doubtful-looking one was passed over.

With regard to its general plumage, *Aquila hastata*, like *Aquila nævia*, has two distinct stages, viz. the "spotted" and uniform pale brown. It is, indeed, a "Spotted Eagle," just as much as the latter, and, like it, probably takes several years before it assumes its fully mature dress. The length of the wings, which *fully equal or exceed the tail, and the slight difference in the size of the sexes*, are remarkable features in this bird. To make its history as complete as possible, I sent all my specimens to Mr. Brooks, C.E., Etawah, and I am indebted to him for the following descriptions of them. I was very near omitting to mention that, as far as I am aware, these specimens are the first as yet recorded from the North-Western Provinces, strictly so defined.

A (♀). Futtehgurh district, extreme north, 28th September, 1871.—Cere and gape lemon-yellow; bill pale plumbeous blue at base, rest horny black; irides hazel-brown; feet pale yellow.

General colour of plumage, above and below, as far as vent, hair-brown; it is, however, in the moult, and the feathers are of different shades. Many of the head-feathers and neck-hackles have pale tips. The bend of the wing, as also the shoulder, has a spotted appearance, as most of the lesser wing-coverts are tipped with dull white or pale fulvous. Upper tail-coverts light brown, and almost white at junction with tail; most of them have white tips. Tail plain hoary brown, darker along the shafts of the feathers; some of them show *indistinct* whitish, greyish, or hoary bars, which are

almost *square* to the shaft, but are *very slightly* inclined upwards. The *uppermost* tail-feathers do not show any barring; and the lower surface is of a uniform hair-brown. The lower tail-coverts are paler, and a good deal mottled and tipped with brownish white. The under surface of the tail shows the bars very distinctly in all the feathers. The tarsi are whitish brown, streaked with darker brown. Most of the primaries and secondaries are barred in their inner webs; lining of wing pale brown, mottled with brownish white. It is probable that some of the longer primaries in this specimen may not be fully grown. There is a strong purple gloss on the upper plumage, especially on the tertials. The spots on the wings of this moulting bird are of a rich buff on the new feathers, and they are almost white in the old ones, sufficiently proving that the spots are not lost in one moult. The new feathers are also just as freely spotted as the old ones.

B (♂). Futtehgurh district, two miles south of the Ganges, 28th October 1871.—Cere, gape, and angle of eye lemon-yellow; feet the same; irides *light* yellow; bill, basal half light plumbeous blue, rest blackish.

This specimen differs from specimen A in having its moult further advanced; and the upper surface generally is of a darker hair-brown. The tips of yellow-brown on the head are more distinct; and the spots on the wings are much more profuse. At the bend of the wing and along the ridge to the shoulder they are quite confluent. Those on the new feathers are ruddy or buff-white, while those on the old ones have faded to quite white. These spots extend to *all* the coverts of the wing, so that it is, to a certain extent, quite a "Spotted Eagle;" they are, however, *confined* to the *wing-coverts*. The upper tail-coverts are the same as in specimen A—namely, very pale brown, tipped with white. Tail also hoary brown, barred as in specimen A. The bars, however, do not extend right *across the feathers*, but occupy the *central* part. They slightly incline upwards, and are greyish white. The ends of the secondaries in both birds are very pale brown; lining of wing brown, mottled with pale yellow-brown. Tarsi pale yellowish brown, marked with darker brown, in the form of bars. Lower tail-coverts largely marked with brownish white, so as to present a much lighter appearance than the rest of the bird. The abruptly defined white borders to the ends of the upper tail-coverts are a peculiarity of this Eagle.

C (♀). Raepore, Central India (in Mr. Brooks's collection).—This is very similar to specimen A. It appears, however, to be older, and was shot in March. The well-defined white borders to upper tail-coverts are worn off, leaving the ends of a brownish-white appearance; they are rather ragged. This bird has the pale tips to the tibial and tarsal plumes very distinct. There are a few pale tips to some of the head-feathers; but they are very minute, about $\frac{1}{20}$ of an inch across.

D (♂). Futtehgurh district, six miles north of the Ganges, 6th November, 1871.—Soft parts *ut suprà*. This bird differs from specimen C in being *profusely* spotted on the wings; every covert-

feather has a whitish spot at the tip, and so have the last two tertials. The colour of the tertials is a very pale brown. The spots on the wing are most numerous from its bend to the junction of the body. One or two of the upper scapulars are pale-tipped. Nearly all the feathers of the head and neck-hackles have minute pale tips, the size of a pin's head. Most of the abdominal feathers have pale tips; and the tibial and tarsal plumes are all edged with this pale rufous brown. The lower part of the tarsus is a light sandy brown. The white borders to the upper tail-coverts are most conspicuous. There is very little indication of barring on the central tail-feathers; but on opening the tail the other feathers are seen to be very distinctly barred with hoary grey.

E (♂). Futtehgurh district, four miles north of the Ganges, 8th November, 1871.—This is an older bird, and is devoid of spots, except at the bend of the ridge of the wing to its junction with the body. On the latter part, or ridge, the spots are so thick as to be confluent (I ought to mention that this is the case in all the specimens as yet noticed). This specimen has no pale tips to the head-feathers; the well-defined white border to upper tail-coverts has disappeared, and these feathers are now simply very pale brown, with dark shafts, shaded to dull white at the edges and tips. Tail hoary brown, showing *no bars above*; it is only on opening them that very obsolete bars are visible in the inner webs of the *outer* feathers. The under surface of this bird is of a very uniform hair-brown, paling slightly towards the vent, as also on the tibia and tarsi, the latter being quite sandy on its lower half. There are no pale tips to the abdominal feathers; and those on the tibial and tarsal plumes have nearly all disappeared. The lower tail-coverts are pale brown, mottled with white. This specimen is in the moult, and the whole bird shows a mixture of old and new feathers. Some of the tail-feathers are only half-grown.

F (♀). Futtehgurh district, extreme *south*, on the banks of the *Kalee Nuddee* (river), 19th November, 1871.—This is a still more mature bird; the spots on the wings have *all* vanished. The upper tail-coverts are pale brown, with darker central line; there are no light edges or tips to abdominal feathers, nor are there any light edges to the tibial and tarsal plumes; the latter are plain brown to junction with foot. Lower tail-coverts light brown, with dark central stripes; towards the tips they are rather pale. Feathers on the top of the head *indistinctly* tipped with light brown. Tail, as seen from above, without bars; but obsolete barring is visible on opening it. This specimen is also in the moult; the whole bird, especially the coverts of the wings, is of different shades of brown. It is, however, generally a darker bird than any of the others, being almost as dark as *some* specimens of *mature A. nævia*.

As is the case with *Aquila nævia*, this Eagle also is subject to a strong purple gloss, and, like it, has the plumage soft and silky. The primaries and secondaries in the *fully adult* bird, No. 6, are *not barred* on the inner webs as in *A. fulvescens*, but are plain as in

adult *A. nævia*. The nostril is even more circular than in that bird (*A. nævia*), being a *very broad* ellipse, slightly inclining forwards. The tibial plumes in *Aquila hastata* are *scanty, and very different* from the well-furnished legs of *A. imperialis* and *A. fulvescens*.

Subjoined are the measurements of the above six specimens:—

Number of specimen.	Sex.	Weight.	Length.	Wing.	Tail.	Bill at front.	Bill along curve.	Bill, height at base.	Tarsus.	Tibia and tarsus.	Mid toe and claw.	Hind toe and claw.	Mid claw.	Hind claw.
		lb. oz.												
A.	♀	3 0	24·1	18·2	10·0	1·25	2·05	·94	3·62	8·2	3·05	2·2	1·1	1·3
B.	♂	2 13	24·5	18·5	10·0	1·4	2·2	1·0	3·92	8·5	3·1	2·23	1·27	1·25
C.	♀	.....	26·0	18·5	9·25	1·2	1·9	·95	3·75	8·5	3·05	2·2	1·1	1·3
D.	♂	2 11	24·0	17·8	9·25	1·3	2·05	·97	3·6	8·5	2·9	2·1	1·17	1·15
E.	♂	2 9½	25·0	18·8	10·0	1·25	1·93	·9	3·6	8·7	3·0	2·4	1·17	1·4
F.	♀	3 10	25·5	18·75	10·25	1·22	2·03	·97	3·8	9·1	3·3	2·1	1·3	1·5

Remarks.—A. Wings exceed tail by ¼ inch. B. Wings equal with tail. C. Mr. Brooks's bird. E. & F. Wings exceed tail by ¼ inch.

31. AQUILA PENNATA, Gmel. (The Booted Eagle.)

Decidedly rare in this part of the country. I procured two specimens (♂ and ♀), the only ones I saw. The first is a fully mature bird with pure white abdomen; the latter immature, having the underparts of a uniform dark brown.

My first introduction to this Eagle took place on the 18th March last. When driving along the Etawah branch canal, close to its junction with the Mynpoory road, I saw what at first appeared to me a Buzzard (*Buteo ferox*, a common bird in that neighbourhood), in pursuit of some insect on the ground, which was constantly escaping from its grasp. The bird was extremely wary, and I had great difficulty in approaching it within shot.

Dimensions (mature male). Length 21·5 inches; wing 16; tarsi 2·8; foot, greatest length 4·5, greatest breadth 3·7; mid toe to root of claw 1·7, its claw along curve 1·2; hind toe to root of claw 1, its claw along curve 1·6; bill, straight from base of cere to point 1·5, along curve 1·6, from gape 1·6, width at gape 1·1. Weight 1 lb. 13 oz.

Description. Cere and gape bright yellow; feet dirty yellow; irides pale brown; bill blackish at the tips, basal half pale blue; the breast is light brown; abdomen pure white; the white spots between the neck and wings were most conspicuous before the bird was skinned; and there is decidedly a rudimentary crest. The other characters are the black supercilium, streak between the lores and eyes, and dark stripe down the centre of the throat. All these points are equally present in the other bird, an immature female. I think it is safe to conclude that the white-bellied bird, as is the

case with *Eutolmaëtus bonellii* and *Pernis cristata*, is the adult garb, although this is at variance with Dr. Jerdon's opinion; and Mr. Hume inclines, I think, to the same belief.

33. EUTOLMAËTUS BONELLII, Temm. (Bonelli's Eagle.)

This noble and magnificent Eagle is pretty generally distributed in suitable localities. I procured a good many specimens; and, with one exception, they were all in the mature dress. If the breadth of the striation on the under plumage is indicative of age, as is supposed to be the case by Mr. Brooks*, some of my birds must have been very old indeed, as the linear ovate marks on the tips of some of the feathers on the flanks and thighs were nearly a quarter of an inch broad.

My notes regarding this Eagle refer to their breding-season, January and February, during which period I invariably found them in pairs, or at no distance from each other. The only solitary example was the immature one above referred to; and it must then have been one or two years old. From this it might be inferred that it does breed in the younger dress, as some Raptores are known to do. The under plumage of this one was of a uniform dark ruddy brown, the striation being very narrow, confined entirely to the shafts of the feathers. It is curious that, while in migratory Raptores (*Aq. nævia, nævioides, imperialis*, &c.) the preponderance of young birds is so marked, the reverse should appear to be the case with this Eagle, a permanent resident. This, however, may be accounted for by the "Morunghee" in its plain brown stage being passed over at a distance for some other bird.

The straggling belt of dhak-jungle (*Butea frondosa*) which runs at broken intervals through the entire length of the Doab (N. W. P.), marking, as is supposed, the old bed of some river, is *par excellence* the favourite habitat of this noble bird. Here *Aquila bonellii*, seated on the summit of a lofty peepul or burgot seems to be monarch of all he surveys; and woe betide any luckless Peafowl, Hare (*Lepus ruficaudatus*), or Partridge (*Ortygornis ponticeriana*) that happens to come within tempting distance. In the course of a morning's march through this scrub-jungle, studded here and there with gigantic trees, and well stocked with game, I have seen two or three pairs. Each pair seems to hold sway over a circuit of two or three miles; and they do not apparently intrude upon each other's hunting-grounds. Early in the morning they may be seen seated on the summit of some high tree which commands the neighbouring country; but if later in the day, they are on the wing, sailing over the jungle in search of food.

This dhak-jungle, besides furnishing these game-killing Raptores with such large quarry, encloses numerous shallow jheels, which are the favourite resort of aquatic birds early in the season, and it has consequently an additional charm for this rapacious Eagle, as well as for other birds of prey.

According to Mr. Hume's experience†, this Eagle would appear

* Ibis, 1869, p. 44. † Rough Notes, pt. i. p. 189.

to nidificate by preference on ledges of cliffs and old ruins. Doubtless it is a rock-building species; but it is one of those Raptores that adapts itself to circumstances, by building on trees near places that abound with its most natural food. I have no doubt that, in the absence of the above sites, they build commonly throughout the country I have alluded to, perhaps exclusively, on huge-limbed peepul and burgot trees.

I was particularly unfortunate with regard to the eggs of this Eagle, as the country was new to me, and I was just a little too late. The only eyry that rewarded my exertions (4th March) was placed on just such a tree as I have described, and contained a pair of "squabs" about a week old, for all the world like pure white powder-puffs. Even at that early age, there was no mistaking the characteristic legs and claws of young *A. bonellii*. I was very much struck by the affection shown by the female bird for her offspring; for she flew in and out of the tree even after I had twice wounded her, before I was aware that her nest was there. None of my men could climb the tree, owing to the enormous girth of the trunk; nor was any nest visible from below, as the foliage was dense, and the lower branches were covered with a thorny creeper. With the help of an extemporized ladder, ropes, &c., I managed to reach to where the trunk bifurcated into two huge boughs, and from *there* saw the position and shape of the eyry, which was placed on a horizontal bough at no great distance from the ground; but it was completely hid from view.

My next acquaintance with young *A. bonellii* (17th March) took place under circumstances worth recording; for it is something quite new in the history of this Eagle for it to usurp the nest of another bird. The one in question belonged to *Haliaëtus leucoryphus*; and as it was tenanted, I had the curiosity to have it examined. Before my climber had ascended a few feet, out flew an old Bonelli's Eagle, leaving a fine fat young one, the only inmate of the nest. It succumbed at last to a surfeit of Crows and Doves, the only food my Shikaree would give it, as he maintained that was the most strengthening flesh for all Hawks.

It has been suggested to me that the nest above alluded to was *built* by the parent birds; but I am as positive as it is possible for one to be in such matters that it was an old one belonging to *H. leucoryphus*, whose young, even supposing the nest to have been occupied that year, must have flown a month or two earlier. There is no mistaking the bowl-shaped nest of this Sea-Eagle; and I am most familiar with it. In its position, shape, size, and architecture it differed most materially from that built by Bonelli's Eagle, which I had seen only a short time before, and was exactly similar to the scores of nests belonging to the other species which I have examined from time to time. Besides, this nest was placed on the very top of a *leafless* peepul, in a most public part of the canal-banks, which was a regular thoroughfare. No Bonelli's Eagle would have *built* in such a situation.

I have not seen this species in company with other Eagles. It is

essentially a clean feeder, and never consorts with its brotherhood over a dead carcass. It is, however, worth mentioning that the craw of one which I shot was very much distended, and to my surprise contained the *leg and foot complete* of a Short-eared Owl (*Otus brachyotus*)! How such a morsel could have been digested it is impossible to say. The old Scotch proverb, "Hawks dinna pick out Hawk's een," if taken in a literal sense, is certainly not applicable in this case.

Since writing the above, I have obtained another immature example, which is certainly a year older than the one already mentioned, as the dark ruddy-brown plumage beneath has given place to a pale fawn-colour: and the vent and thigh-coverts are assuming a whitish appearance. Probably this bird does not assume its full adult plumage before the fourth year.

38. CIRCAËTUS GALLICUS, Gmel. (The Short-toed Eagle.)

Generally distributed in suitable localities. Lays a single white egg, from January to March, and generally selects a solitary tree in an open plain for its nest. This Eagle is easily distinguished, either when soaring or sitting on a tree; it is rarely seen in well-wooded country.

39. SPILORNIS CHEELA, Daudin. (The Crested Serpent-Eagle.)

By no means an uncommon bird, and has exactly the opposite habits of the preceding one. It is very local, and only met with in well-wooded, watery places. In short, it affects the same sort of ground as the Spotted Eagle; and, like it, subsists almost entirely on Green Frogs. It is a very tame bird, and sits in a slouching manner on a low bough of a tree overlooking some stagnant pool. I have never seen it on the wing, unless made to fly. Does not breed in the plains.

42. HALIAËTUS LEUCORYPHUS. (Pallas's Sea-Eagle.)

These fine birds are common, frequenting rivers, canals, and jheels. Although fish forms their chief sustenance, there is no doubt that they feed largely on aquatic birds; and, judging from their numbers, and the quantity of feathers one meets with along the edges of jheels, they must be the most destructive Eagles in the country. The nest of one examined contained the bones of the common Hare (*Lepus ruficaudatus*). Nidification commences early in November, and lasts till February. Two is the usual number of eggs they lay, exactly similar to those of *Haliaëtus albicilla*; but I have three taken from a nest not long ago; this, however, is very unusual.

Next to *Gyps bengalensis*, this is the earliest breeder among our Indian Raptores. A case has come to my knowledge of this Eagle completing the outer fabric of its nest as early as the 10th of October, and then actually forsaking that locality for about three weeks, when both birds suddenly returned and finished their homestead.

They build invariably on trees, on the banks of rivers, or close to jheels, which are thronged during the cold season with innumerable waterfowl, and thereby secure ample food for themselves and their

offspring. During midday they frequently soar to a tremendous height, uttering a harsh, clanging cry, which can be heard a mile off. I have frequently been guided to their nest from their noise.

42 *bis*. HALIAËTUS ALBICILLA (*H. pelagicus* et *H. brooksii*, Hume). (The White-tailed Eagle.)

I once saw an immature bird of this species; and as it was in company with a young *H. leucoryphus*, there was no doubt as to its identity. It was dreadfully wild and unsettled, not allowing me to approach within any thing like shot.

Several immature White-tailed Eagles have been seen and procured in the country to which these notes refer; and the recent capture of a mature specimen in the Punjab * places the identity of this species beyond doubt.

45. BUTEO FEROX, Gmelin. (The Long-legged Buzzard.)

This large and handsome Buzzard occurs in great numbers throughout all the districts of the North-western Provinces, affecting alike both moist and dry localities; it avoids, however, well wooded country. It is only a cold-weather visitant, arriving in October, and leaving again for their breeding-haunts by the first week in April.

In the arid dry plains of the Etawah and Mynpoory districts, where these birds occur in surprising numbers, they feed almost exclusively on desert-rats; but in swampy localities their food consists to a great extent of frogs, crabs, &c.

I have *frequently* found these Buzzards flying about late in the evening, even *after dusk*; but have rarely got within shot of them at that hour. Their acute sight and noiseless flight makes one believe they are somewhat crepuscular in their habits. These Buzzards are subject to almost more variation in their plumage than any other bird; but their transitional stages are as yet desiderata.

48. POLIORNIS TEESA, Franklin. (The White-eyed Buzzard.)

Abundant, and appears to have no choice as to habitat, as they are found alike everywhere. Feeds on rats, mice, and all manner of crustaceans. Is extremely noisy and easily tamed. Breeds in March and April, laying usually three eggs, of the Goshawk type.

50. CIRCUS CYANEUS, Linn. (The Hen-Harrier.)

Rather rare.

51. CIRCUS SWAINSONI, A. Smith. (The Pale-chested Harrier.)

Common. I have several times seen this Harrier in the act of killing small birds.

54. CIRCUS ÆRUGINOSUS, Linn. (The Marsh-Harrier.)

Abundant in marshes and neighbourhood of jheels. Obtained in every variety of plumage, including a *uniform dark brown, nearly*

* Ibis, 1871, p. 404.

black, with pale fulvous *nuchal* spot. This variety is extremely rare. Feeds frequently on wounded Ducks and Teal, but never attempts to carry off the quarry, and eats it on the spot.

55. HALIASTUR INDUS, Bodd. (The Brahminy Kite.)

Essentially a marsh-bird; but, though extremely common in Lower Bengal, is far from being so in the North-western Provinces, and then only in wet cultivation. Builds on high trees, invariably in the vicinity of water, constructing a nest very much after the fashion of the Common Kite.

Nidification commences about February; their eggs resemble poorly marked specimens of *Buteo vulgaris*; and they rarely lay more than a pair.

56. MILVUS GOVINDA, Sykes. (The Common Kite.)

Universally present. They commence building early in cold weather; but December is the most general time for them to lay. My first eggs last year were got on the 18th of November, and they must then have been a week old.

These birds are perfectly fearless, and breed by preference in the most densely populated parts of villages and bazars. The countless varieties of their eggs defy all description.

56 *bis*. MILVUS MAJOR, Hume. (The Larger Kite.)

This, I am informed, is the common Kite of Cashmere, and it is only a cold-weather visitant to the plains of India. They are by no means uncommon; but there are probably few birds so difficult to procure, owing to their excessive wariness. Its slow heavy flight, together with the white under the wings, suffice to distinguish it at a glance.

In most of the specimens I have examined, the white under the wings is most conspicuous; the inner webs of the primaries, as far as the emarginations, are more or less pure white. Some birds have this part mottled; but the white predominates.

I have just now an undoubted *male* of this species before me in the *flesh* of the following dimensions:—Length 24¼, wing 19¼, tail 12¾. This is an unmistakable *Milvus major*, indeed a monster Kite.

I have, however, specimens of a Kite with *all the characters* of *Milvus major*, but considerably smaller. It is also a cold-weather visitant, and is equally shy as the former. Mr. Brooks has examined these birds in my collection, and agrees with me in referring them to another species: they may be *Milvus affinis*, or perhaps more probably *M. melanotis* of Temminck.

I shot a very fine female of this lesser Kite in my camp last year, close to the railway station at Etawah; it was in company with several of the common species, and attracted my notice for several days, owing to its large size and the white under the wings.

Undoubtedly we have three species of Kites in India, two of them being migratory.

57. PERNIS CRISTATA, Cuvier. (The Crested Honey-Buzzard.)

Common, and is easily recognized on the wing, at any stage of plumage, by its peculiar flight. Seems to be an object of special aversion to Parrots (*Palæornis torquatus*), which invariably pursue this species with every appearance of hatred. I have frequently watched a flock of Parrots in the act of pouncing down on one of these birds, even from a considerable height. The Honey-Buzzard seeks refuge by flight, but is immediately overtaken and mobbed by its pursuers, till at last it manages to conceal itself in some densely foliaged tree. I have found this species building in March and April, but have never succeeded in procuring their eggs.

The food of this Buzzard consists of honeycombs and insects. The craw of one I examined contained *more* than half a pound of wax, honey, and bees; the culmen and scale-like feathers of the head were quite sticky from the freshly eaten honey.

I once, however, saw this bird in the act of pursuing something in long grass, half flying and half running, which I think must have been a Leveret. Its erectile crest, golden-coloured eyes, and rapid movements gave it a very fine appearance. I believe it is not above eating small birds; for one perched one day on a small enclosure wall within a few paces of my tent, casting wistful glances at my chickens.

The jemadar of my guard, a high-caste Hindoo (Thakoor), picked up a specimen of this bird that I had thrown away; and, on my expressing my surprise at his touching it, he informed me that it was a mistake to consider this bird as belonging to the Hawk-kind, as its food was pure honey, and, further, that it was delicious eating! He called it "Mud-kare," which signifies literally honey-comb-eater.

59. ELANUS MELANOPTERUS, Daud. (The Black-winged Kite.)

This handsome little bird, the connecting-link as it were between the Harriers and Kites, affects open, marshy country, and is generally found seated on a small tree.

It is by no means a common bird in these parts; and though it is a permanent resident, we know next to nothing about its nidification. I believe the bird breeds in the Oudh Terai, as in the month of April one year, when out tiger-shooting in that locality, I saw great numbers of them, and am almost certain I once saw one fly off its nest.

The immature bird, in its mottled stage, has the iris *yellow*; but every mature specimen that I have seen has it *blood-red*.

60. STRIX INDICA, Blyth. (The Indian Screech-Owl.)

Common.

65. BULACCA OCELLATA, Lesson. (The Mottled Wood-Owl.)

Common. This species frequently *builds a nest*, laying usually a pair of eggs, generally in February and March.

68. OTUS BRACHYOTUS, Gmel. (The Short-eared Owl.)

Abundant in cold-weather months, arriving in October, and leaving again by the end of March. Confines itself almost entirely to grass lands; in a day's shooting dozens are put up.

It flies remarkably well during the day; and it is by no means uncommon to see them soar almost out of sight, especially if attacked by Crows and King Crows.

69. ASCALAPHA BENGALENSIS, Franklin. (The Rock Horned Owl.)

Common.

70. ASCALAPHA COROMANDA. (The Dusky Horned Owl.)

Abundant. Lays generally two eggs in December and January. I have taken their eggs from the old nest of a Kite, as also from the bare fork of a tree.

I was once riding along the banks of the Cawnpore Branch Canal late in the evening, quite dusk, at low-water mark, when I was suddenly startled by the cry of a Heron in distress, which flew past me, under the level of the bank, close to the surface of the water, hotly pursued by one of these Owls. I immediately galloped after the birds, and by dint of shouting and screaming made the Owl give up the chase. Judging from the numbers of feathers of Herons and Egrets which one meets with along the canals, there is reason to conclude that these birds are commonly preyed upon by this powerful Owl.

72. KETUPA CEYLONENSIS. (The Brown Fish-Owl.)

Pretty generally distributed, in suitable localities.

76. ATHENE BRAMA, Temm. (The Spotted Owlet.)

Abundant. The roof of my present bungalow, as well as that of the Club-house at Futtehgurh, is infested by them; they are a dreadful nuisance at times; and there is no getting rid of them.

Breeds from January to March, laying usually four eggs, exactly similar to those of *Scops aldrovandi*. I have found this species breeding alike in holes of trees and eaves of houses.

They are excessively fond of flying about during the middle of the day, and sally forth long before dusk.

3. A List of the *Cypræidæ* found on the Coast * of New South Wales. By JOHN BRAZIER, C.M.Z.S., M.R.S.N.S.W.

[Received January 2, 1872.]

During a tour of five months through the northern parts of New South Wales in 1870, I travelled over 300 miles of coast-line, and

* The extent of coast-line of New South Wales commences at Point Danger, in latitude 28° 8′ S., and terminates at Cape Howe, in latitude 37° 30′ S.

found species that have never been recorded from this part of the world. It is of importance that those who from personal observation are in a position to do so should give to the scientific world the benefit of their researches, especially when they are able to correct errors, or to increase our knowledge of the geographical distribution of species.

Genus Cypræa, Linnæus.

1. Cypræa carneola, Linn.

Hab. Bottle-and-Glass rocks, Port Jackson; Cape Banks, Botany Bay. This may be considered its furthest southern limit. It is very common to the north, at the mouth of the Macleay, Nambuccra, Bellinger, Redbank, and Clarence rivers.

2. Cypræa isabella, Linn.

Cypræa controversa, Gray.

Hab. Headland three miles north of the Nambuccra River, also Bellinger-River bar.

This is not the true *C. isabella*, Linn., but the variety named *controversa* by Gray. Rare here, but common in the Central Pacific Islands.

3. Cypræa fimbriata, Gmel.

Hab. Cape Solander, Botany Bay, Lake-Macquarie beach, and the mouth of the Clarence River.

4. Cypræa macula, A. Adams.

Hab. Botany Bay; Bottle-and-Glass rocks, Port Jackson; Broken Bay; Newcastle; Port Stephens; Port Macquarie; Macleay, Nambuccra, Bellinger, Redbank, and Clarence rivers; also Moreton Island in Moreton Bay.

5. Cypræa felina, Gray.

Hab. Twofold Bay, Botany Bay, Port Stephens, Port Macquarie, and at the mouths of all the rivers north of Port Macquarie.

6. Cypræa ursellus, Gmel.

Hab. Cape Banks, north head of Botany Bay.

7. Cypræa hirundo, Linn.

Hab. Redbank and Bellinger rivers.

8. Cypræa asellus, Linn.

Hab. Cape Banks, Botany Bay; Port Jackson; Port Stephens; Port Macquarie; Nambuccra, Macleay, Bellinger, Redbank, and Clarence rivers.

Our specimens are larger and more deeply coloured than those from New Caledonia and Ceylon. I have not seen the species south of Botany Bay.

9. Cypræa tabescens, Soland.

Hab. Broken Bay, Lake Macquarie, Port Stephens, and Port Macquarie; Macleay, Nambuccra, Bellinger, Redbank, and Clarence rivers.

10. Cypræa scurra, Chem.

Cypræa indica, Gmelin.
Hab. Broken Bay, north of Port Jackson.

Subgenus Aricia, Gray.

11. Cypræa arabica, Linn.

Hab. Cape Banks, north head of Botany Bay; Macleay, Nambuccra, Bellinger, Redbank, and Clarence rivers.
The specimens found at Botany were all young shells, and obtained, during a very low tide, under large stones.

12. Cypræa moneta, Linn.

Hab. Redbank River, twenty miles south of the Clarence River.
This species, so common in the tropics, is also common at the above locality; it is thrown on shore after gales, with the animal dead in the shells.

13. Cypræa annulus, Linn.

Hab. Cape Banks, Botany Bay; Bottle-and-Glass rocks, Port Jackson; Redbank River.
This species, in common with *C. moneta*, is found thrown up on the beach after gales, near the Clarence River.

14. Cypræa caput-serpentis, Linn.

Hab. Cape Banks, Botany Bay; Shark Island, Port Jackson; Lake Macquarie; Broken Bay; Macleay, Nambuccra, Bellinger, Redbank, and Clarence rivers.
A specimen that I obtained at Botany Bay was jet-black. It is not found south of that place.

Subgenus Luponia, Gray.

15. Cypræa vitellus, Linn.

Hab. Cape Banks, Botany Bay; Schnapper Rock, Coogee Bay; Point Piper; Port Jackson; Broken Bay; Port Stephens and Port Macquarie; Macleay, Nambuccra, Bellinger, Redbank, and Clarence rivers.
I have not found this species south of Botany Bay.

16. Cypræa lynx, Linn.

Cypræa vanelli, Linnæus.
Cypræa squalina, Gmelin.
Hab. Bellinger-River bar.

17. Cypræa helvola, Linn.

Hab. Bellinger-River beaches.

18. Cypræa poraria, Linn.

Hab. Bellinger and Redbank rivers.

19. Cypræa clandestina, Linn.

Cypræa moniliaris, Lamarck.

Hab. Cape Banks, Botany Bay; Watson's Bay, Port Jackson; Port Macquarie; Macleay, Nambuccra, Bellinger, Redbank, and Clarence rivers.

I obtained living examples of this species at Botany during a very low spring tide under stones, but have not seen it any further south.

20. Cypræa xanthodon, Gray.

Hab. Watson's Bay, Port Jackson (*Mr. G. F. Angas*); Broken Bay; Port Stephens; Port Macquarie; Macleay, Nambuccra, Bellinger, Redbank, Clarence, Richmond, and Tweed rivers.

This species I have very rarely found in good condition.

21. Cypræa subviridis, Reeve.

Hab. Port Stephens, Port Macquarie; Bellinger, Redbank, and Clarence rivers.

Mr. Sowerby, in his 'Thesaurus Conchyliorum,' erroneously states that this species inhabits the Cape-Verd Islands. New-Caledonian specimens are more pyriform and lighter in colour than those found on the Australian coast.

22. Cypræa flaveola, Linn.

Hab. Botany-Bay Heads; Broken Bay; Lake Macquarie; Port Stephens; Port Macquarie; also Macleay, Nambuccra, Bellinger, Redbank, and Clarence rivers.

This species is not very common at any of the above localities.

23. Cypræa spurca, Linn.

Hab. Cape Solander, south head of Botany Bay (*Mr. Hargraves*); Newcastle beach, near Redhead, north of Port Jackson.

This species may be distinguished from *C. flaveola* and *C. gangrænosa* by the back being always clouded and ocellated with yellow.

24. Cypræa lutea, Gronov.

Cypræa humphreysii, Gray.

Cypræa commixta, Wood.

Hab. Lake Macquarie; Newcastle beach; Redbank and Clarence rivers.

The variety *humphreysii* has the back of the shell olive-brown, with two narrow milky-blue zones, and comes from Nichol Bay, North-west Australia.

25. Cypræa piperata, Soland.

Hab. Twofold Bay and Shoalhaven.

This species is also found at Port Lincoln, St. Vincent's Gulf, Port-Adelaide Creek, South Australia, and at Cape Riche, King George's Sound.

26. Cypræa bicolor, Gask.

Hab. Lake Macquarie and Bellinger River.

This species may be recognized by its pyriform shape and by the teeth being much finer than in *C. piperata* or *C. comptoni*. Some four years since some hundreds of *C. bicolor* were washed on shore upon the outer beaches of Lake Macquarie, after an easterly gale of wind.

27. Cypræa comptoni, Gray.

Hab. Twofold Bay.

It is also found at Port Lincoln, South Australia; Cape Riche, King George's Sound, and on the north coast of Tasmania.

28. Cypræa erosa, Linn.

Hab. Bottle-and-Glass rocks, Port Jackson; Broken Bay; Port Stephens; Port Macquarie; Macleay, Nambuccra, Bellinger, Redbank, and Clarence rivers.

This species is found thrown up on all the outer beaches after the winter gales, and obtained alive under stones in the harbours.

29. Cypræa caurica, Linn.

Hab. Cape Banks, Botany Bay; Broken Bay.

This species, like the preceding, extends from Broken Bay northwards along New South Wales to Queensland.

30. Cypræa cruenta, Gmel.

Cypræa variolaria, Lamarck.

Hab. Bellinger and Redbank rivers; also a few dead specimens have been found at Lake Macquarie.

31. Cypræa miliaris, Gmel.

Hab. Macleay River, under Grassy Head.

32. Cypræa errones, Linn.

Cypræa olivacea, Lamarck.

Hab. Cape Banks; Botany Bay; Middle Harbour, Port Jackson; Broken Bay; Port Stephens; Port Macquarie, and all the other northern beaches of New South Wales.

Subgenus Cypræovula, Gray.

33. Cypræovula umbilicata, Sow.

Hab. Off Wollongong (?), deep water.

"Several living specimens of this rare shell were dredged in deep water, at a distance of two miles off the coast, a little to the southwards of Wollongong, by Commodore Loring, C.B., when commanding H.M.S. 'Iris.' They are somewhat smaller and paler in colour than the ordinary Tasmanian examples."—*Mr. G. F. Angas*, Proc. Zool. Soc. 1867.

Genus TRIVIA, Gray.

34. TRIVIA AUSTRALIS, Lam.

Hab. Shark and Clark Islands, Watson's Bay; Bottle-and-Glass rocks, Port Jackson; Lake Macquarie; Port Stephens; Port Macquarie; Macleay, Nambuccra, Bellinger, Redbank, and Clarence rivers. Tasmanian specimens are very large.

About four years ago there were some thousands of this species washed on shore at the outer beaches, Lake Macquarie, after an easterly gale.

35. TRIVIA CANDIDULA, Gask.

Hab. Bottle-and-Glass rocks, Port Jackson.

I obtained two living examples of this rare *Trivia* under a large stone during an unusually low spring tide.

36. TRIVIA GLOBOSA, Gray.

Hab. Cook's Landing Place, Botany Bay; and Little Bay, between Port-Jackson Heads and Botany.

37. TRIVIA INSECTA, Mighels.

Cypræa hordacea, Kien.

Hab. Little Bay, also Cabbage-Tree Bay, outside the north head of Port Jackson.

Subgenus PUSTULARIA, Swainson.

38. TRIVIA LIMACINA, Lam.

Cypræa interstincta, Wood.

Hab. Nambuccra and Bellinger rivers.

This species appears to be confused by some authors with the *C. staphylæa* of Linnæus; but they are undoubtedly two distinct species, the teeth on the base of *C. limacina* being always large, and not extending across the base as in *C. staphylæa*.

39. TRIVIA STAPHYLÆA, Linn.

Hab. Broken Bay and Newcastle.

This species is common on the New-South-Wales coast.

4. On a fourth Collection of Birds from the Pelew and Mackenzie Islands. By Dr. G. Hartlaub, F.M.Z.S., and Dr. O. Finsch, C.M.Z.S.

[Received December 6, 1871.]

It was in the year 1867 that we had the first opportunity of reporting to this Society* on a small collection of birds from the Pelew and Mackenzie Islands, which, from their geographical position, may be considered of especial interest. These groups of islands are close to each other, connected by several small islets, and form the most western corner of the extensive archipelago of the Carolines. Since that date we have received two other collections from the Pelews†, forwarded to us through the Museum Godeffroyanum of Hamburg and the Museum of Altona (Dr. Semper), which have extended our knowledge of the avifauna of this group to a high degree. It is with great satisfaction that we now record the receipt of a new and still more complete collection from the localities mentioned above, sent to us for scientific determination by Mr. Johann Cesar Godeffroy, to whom science is greatly indebted for the exploration of some almost unknown groups of islands in the Pacific.

This collection was formed by Mr. Kubary (a young traveller in the service of Mr. Godeffroy, whom we had the pleasure of mentioning in terms of commendation in our last article on birds of Savai, P. Z. S. 1871, p. 22) on the island of Uap, of the Mackenzie group, and by Capts. Heinsohn and Peters, masters of vessels belonging to Mr. Godeffroy, partly at the same island, but chiefly on the Pelews. Thanks to the zeal and diligence of these gentlemen, we are now in the pleasing situation of being able to give a far more complete account of the ornithology of these interesting islands. Not only do we become better acquainted with some little-known species, but the total number of species has been increased. Amongst these additions no less than nine we have the pleasure of introducing as new; and what is more important, some of them appertain to genera not yet known from this locality—such as *Noctua*, *Caprimulgus*, *Campephaga*, and *Phlegœnas*.

Our last list of Pelew birds embraced forty-one species, now we have to add eleven, making the total number fifty-two. Of the Mackenzie group or Ulɔthi, only the island of Uap has been explored. Here we were previously acquainted with six species only (*Myzomela rubratra*, *Monarches godeffroyi*, *Calornis kittlitzi*, *Ardea sacra*, *Numenius phœopus*, and *Tachypetes minor*); now we are able to enumerate twenty. The total number of known birds of this western portion of the Carolines is sixty-four; but of this number

* Dr. Hartlaub, "On a Collection of Birds from some less-known Localities in the Western Pacific," P. Z. S. 1867, pp. 828–832.

† Drs. Hartlaub and Finsch, "On a Collection of Birds from the Pelew Islands," *ib.* 1868, pp. 4–9, and "Additional Notes on the Ornithology of the Pelew Islands," *ib.* pp. 116–118.

only two occur on both groups, and are widely distributed in the archipelago, namely *Myzomela rubratra* and *Calornis kittlitzii*. The rule in the geographical distribution of birds, that islands close to each other are generally inhabited by certain allied species of the same genus, which represent each other, is manifested very clearly with respect to the birds of the Pelew and Uap. The two islands have each two species of *Zosterops*, one *Rhipidura*, one *Campephaga*, and one *Phlegœnas*. The avifauna of Pelew, better known than that of Uap, is richer in peculiar species, possessing twelve, whereas Uap has only six, which species are marked in our subjoined list with an asterisk. Of the other forty-six species known in these groups, twenty-seven are widely distributed over the Indo-Malayan region and the Pacific; but there is a strong tendency towards the birds of the former region, about sixteen being Indo-Malayan, whereas only seven are peculiar Pacific forms. Sixteen species may be regarded as stragglers, some of which are of very rare occurrence, such as *Falco peregrinus* and *Nycticorax griseus*, which visit these islands during their migrations. Nine of the species are European. Two species occur also in Australia.

In comparing the ornithology of these groups of islands with those of other Central-Polynesian groups, and taking into consideration their far less extent, we find that, nevertheless, they are considerably richer. Thus, the Vitis possess sixty species, amongst which eighteen are peculiar; whereas the Navigator group has only fifty, of which sixteen are peculiar; and the Friendly Islands, out of thirty-seven species, only six peculiar. This interesting fact, no doubt, must be considered a result of the far stronger influence of Indo-Malayan species which predominates in the western Carolines.

As a singular fact in relation to the general view of the ornithology of the Western Carolines, we may notice the absence of Fringilline birds and of Parrots, which, in respect of the latter, is the more remarkable, as we know of the occurrence of a very interesting species (*Domicella rubiginosa*) on the small island of Puinipet, of the Seniavin group, which forms the outermost eastern corner of the Carolines archipelago.

Mr. Kubary has given us some meagre notices about the island of Uap and its ornithic life. According to these the interior of Uap consists of a hill-like plateau, which is destitute of trees, and only covered with grass. This hilly interior is surrounded by a narrow strip of wooded land, of a garden-like appearance, not broader than from one to two English miles, which possesses a richer vegetation of areca-palms, banyans, bamboos, and, nearer to the shore, of cocoa-trees. In general the vegetation is much poorer than in Upolu or other Central-Polynesian islands. On the plateau birds are very rare. Mr. Kubary notices only the Kuling (*Strepsilas*) and *Numenius phœopus*, and observed once a small bird, which he believes to have been a *Collocalia*, but which he was not fortunate enough to secure. The greatest amount of bird life is found in the wood-region. Here *Myzomela*, *Zosterops*, *Campephaga*, *Phlegœnas*, *Ortygometra*, and a species of half-wild *Gallus* occurs; the *Myzomelæ*,

Zosteropides, and *Monarchæ* are not unfrequently seen near the houses of the natives. On the shores, *Ardeæ sacra* and *lepida*, *Actitis incanus*, and sea-birds (*Sterna melanauchen*, *Gygis alba*) are numerous.

We commence with a list of all the known species of western Carolinian birds:—

	Pelew group.	Mackenzie group.
1. Falco peregrinus	...	*
*2. Noctua podargina	*	
*3. Caprimulgus phalæna	*	
4. Collocalia vanicorensis	*	
5. Halcyon chloris	*	
6. —— albicilla	*	
7. —— reichenbachi	*	
8. —— sanctus	*	
9. Myzomela rubratra	*	*
*10. Psamathia annæ	*	
*11. Zosterops semperi	*	
*12. —— hypolais	...	*
*13. —— oleaginea	...	*
*14. —— finschi	*	
15. Turdus obscurus	*	
*16. Rhipidura lepida	*	
*17. —— versicolor	...	*
*18. Myiagra erythrops	*	
*19. Monarches godeffroyi	...	*
*20. Campephaga nesiotis	...	*
*21. —— monacha	*	
22. Artamus leucorhynchus	*	
*23. Rectes tenebrosus	*	
24. Calornis kittlitzi	*	*
25. Cuculus canorus	*	
26. —— striatus	*	
*27. Ptilinopus pelewensis	*	
28. Carpophaga oceanica	*	
*29. Phlegœnas canifrons	*	
*30. —— yapensis	...	*
*31. Megapodius senex	*	
32. Gallus bankiva	*	
33. Charadrius fulvus	*	*
34. —— geoffroyi	*	
35. —— cantianus	*	
36. Strepsilas interpres	*	*
37. Ardea sacra	*	*
38. —— sinensis	...	*
39. Nycticorax griseus	...	*
40. —— manillensis	*	
41. —— goisagi	*	
42. Numenius phæopus	*	*
43. Tringa acuminata	*	
44. —— minuta	*	
45. Actitis incanus	...	*
46. —— hypoleucus	*	
47. Rallina fasciata	*	
48. Rallus pectoralis	*	

	Pelew group.	Mackenzie group.
49. Ortygometra quadristrigata	*	*
50. Porphyrio melanonotus	*	
51. Anas superciliosa	*	
52. Fuligula cristata	*	
53. Puffinus dichrous	*	
54. Sterna longipennis	*	
55. —— melanauchen	*	*
56. —— lunata	*	
57. Anous stolidus	*	
58. —— tenuirostris	*	
59. Gygis alba	*	*
60. Phaëton candidus	*	
61. Dysporus piscator	*	
62. —— sula	*	
63. Carbo melanoleucus	*	
64. Tachypetes minor	...	*
	53	20

1. Falco peregrinus, L.

A young male from Uap, captured during the north-east monsoon in November 1870 (*Kubary*). Not yet recorded from this locality.

Long. al.	caud.	rostr.	tars.	dig. med.	ung.	
—	6″ 4‴	$8\frac{1}{2}$‴	2″‴	22‴	8‴	
$13\frac{1}{2}$″	6 10	10	23	25	9	(De Castries Bay.)

In a former collection, forwarded by Mr. Godeffroy, we received a similarly coloured specimen from De Castries Bay, east coast of Amoorland (*Capt. Meyer*).

2. Noctua podargina, n. sp.

Dilute ferrugineo-rufa, vix conspicue transversim variegata maculisque minutis albidis hinc inde notata; capite pallidius fulvescente, indistincte fasciolato; uropygio et supracaudalibus crebrius albo maculatis; maculis nonnullis majoribus albis in alarum tectricibus; alis pallide rufis; remigibus irregulariter et rarius fasciatis, pogonio interno obsolete fuscescentibus; rectricibus pallide rufis, obscurius fasciatis; pectore et abdomine in fundo lætius rufescenti-fulvo irregulariter fasciolato et maculato; subalaribus albido fuscoque fasciatis; rostro pallido; pedibus obscuris.

Long. tot. circa 11″, rostr. a fr. 8‴, al. 6″ 2‴, caud. 3″, tars. 1″.

One very indifferent specimen. The whole bird of an obsolete pale rufous colour, mottled with indistinct and very narrow transverse blackish and fulvous bands; inferior part of back, upper tail-coverts, wing-coverts, and scapularies irregularly marked with white sublanceolate or roundish greater or smaller spots; these spots are surrounded by a blackish margin; wing-feathers with a few indistinct and distant blackish bands, the inner vanes towards the base more

blackish; under wing-coverts barred whitish and fuscous; feathers of the face, throat, and sides of head paler, distinctly and very narrowly banded; there appears to be a pale superciliary stripe; breast and abdomen pale rufescent, with blackish vermiculations and larger whitish darkly margined spots, or short, broad, transverse bands; beak pale yellowish; feet dark; the upper half of the tarsus is feathered.

The collection contains only a single specimen, collected by Capt. Heinsohn at the Pelews. All our efforts to refer this little Owl to any known species have been without success; we must therefore consider it to be new. Its nearest ally seems to be *N. ochracea*, Schleg., from Celebes. The specimen is apparently in full dress; but whether the rufous plumage may be only a phase, as in some other Owls, we are unable to decide. The light-coloured beak and the half-naked tarsi and toes, without any hairs, are especially to be noticed.

3. CAPRIMULGUS PHALÆNA, n. sp.

Supra in fundo rufescente nigro transversim lineolatus striisque latioribus longitudinaliter notatus; uropygio et supracaudalibus distinctius fasciatis; remigibus majoribus nigris, medio dilute rufo bimaculatis; tectricibus et scapularibus pulchre et largius fulvo, rufo nigroque variegatis; subalaribus rufo nigroque fasciatis; macula jugulari alba; abdomine in fundo dilute rufescenti-fulvo fasciolis strictioribus nigris notato; subcaudalibus obsolete fulvo-albidis, rarius nigro fasciatis; rectricibus nigris, fasciis vermiculatis rufis maculatim notatis; rostro et pedibus nigris.

Long. tot. circa 10″ 3‴, rostr. a fr. 5‴, al. 6″ 3‴, caud. 4″ 4‴, tarsi 6‴.

The whole head above reddish brown, minutely mottled with dark brown, and each feather with a broad black shaft-stripe, forming three irregular longitudinal stripes; feathers of the hind neck and mantle dark rufous brown, with dusky patches along the shafts, and mottled indistinctly with dusky; feathers of the sides of neck with a large rufescent middle spot, forming a distinct patch, which is in connexion with the bright rufescent ear-region; larger shoulder-feathers rufous brown, towards the basal half light brownish grey, mottled minutely with dark brown, and with a large apical spot of black on the outer vane, which shows some small rufescent spots; this black is bordered on the upper shoulder-coverts externally broadly with light fulvous yellow, forming along the shoulders a black median stripe, edged externally by an indistinct fulvous-yellow line; rump and upper tail-coverts rufous brown, mottled with dusky, and barred with narrow black lines, more distant on the upper tail-coverts; primaries black, on the basal half of the outer web with three fulvous spots, of which the third is larger and principally visible; the other primaries have six rufous smaller marginal spots, which on the secondaries form irregular cross bands, the first four remiges with a fulvous median spot on the inner web; the remaining

primaries with six rufescent spots internally, which on the secondaries form irregular narrow cross bands; the last of the secondaries greyish fulvous, mottled with pale brown, and across the shaft with six black lines; the first quill has on the basal half four obsolete rufescent marginal spots; the shafts are black, and dark brown beneath; tectrices of the primaries black; tectrices of the secondaries black, with rufescent marginal and apical spots, mottled minutely with dusky; the remaining upper wing-coverts are marked in the same manner, but the rufous spots are smaller, so that the smallest upper wing-coverts near the cubitus are black with narrow rufous edgings; the greater median wing-coverts show a large fulvescent apical patch on the outer web, forming a crossband-like conspicuous mark; under wing-coverts blackish brown, barred narrowly with rufous; feathers, the region beneath the eye, along the angle of mouth, chin and sides of throat rufous, with black apical edgings; throat apparently divided into two, with patches, by a narrow rufous black-barred median line; crop and breast of a rufous-brown ground-colour, each feather towards the tip lighter, changing into greyish fulvescent, finely mottled with dark brown, forming speckled cross lines, and a narrow black shaft-stripe; remaining underparts pale fulvescent, with obsolete narrow dark cross lines, broader and more distinct on the under tail-coverts; three outer tail-feathers black, with nine rufous cross bands, which on the outmost are narrower (here ten), on the second and third broader, and mottled with dusky; on the inner web these rufous cross bands are only indistinctly indicated; the fourth tail-feather shows the nine rufous cross bands broader, distinct also on the inner web, and mottled more with dusky; the two middle tail-feathers have a rufous-brown ground-colour, internally changing into grey-brown, speckled with dusky, and nine irregular black bars. Bill black, bristles (eight) strongly developed, black; feet and nails hornish brown; the tarsus feathered at the basal half, rufescent; shafts of the tail-feathers black.

Long. al.	caud.	rostr.	rict.	tars.	dig. med.	ung.
6″ 3‴	4″ 4‴	5‴	12½‴	6½‴	7½‴	3‴

Of this species a single specimen was collected by Capt. Heinsohn in the Pelews—a locality whence no Caprimulgine bird has been yet recorded. The specimen is evidently a female; and the male, no doubt, will present some considerable differences; perhaps we may expect it will have the primaries as well as the outer tail-feathers spotted with white. Although female *Caprimulgi* are much more difficult to determine, and it might be considered somewhat hazardous to establish a species on an isolated specimen, nevertheless we are obliged to do so, having endeavoured to unite this specimen with any of the known species without success.

C. phalæna seems to come nearest to *C. jotaka*, Temm., from Japan, and *C. stictomus*, Swinh. (Ibis, 1863, p. 250), from Taiwan, but may be distinguished, besides strongly contrasting differences in coloration, by its smaller size; the latter besides has naked tarsi.

Mr. G. R. Gray enumerates (Hand-l. of B. i. p. 57) two Night-

jars from the Philippines, *C. griseatus* and *C. manillensis*, but both are still undescribed.

4. Collocalia, sp.?

Mr. Kubary observed once in the island of Uap a small bird, which he believes to have been a species of *Collocalia*.

5. Halcyon chloris (Bodd.); F. & H. Vög. Ost-Afr. p. 165.

Halcyon albicilla, part., Hartl. P. Z. S. 1867, p. 828 (green-headed spec.); H. & F. *ib.* 1868, p. 4; Sharpe, Kingfishers, t. 73 (hind fig.).

In our first publication on the Birds of the Pelew Islands we noticed, under the head of *H. albicilla*, besides specimens in the normal white-headed plumage, some which showed more or less greenish-blue feathers on the crown, and one with the whole upper head uniform greenish blue like the back, supposing this latter to be the young bird. Unfortunately we had overlooked that the young of the true *H. albicilla* had been already made known by Prof. Schlegel (Vogels van Nederl. Indië, Ijsvogels, p. 32, pl. 11. f. 4), who received a very young specimen, shot by the late Dr. Bernstein the 12th September, 1861, in the island of Morotai. This specimen, represented in the plate cited above, resembles very much the old bird, having already the head white, but with some greenish-blue feathers on the top, like those we received from the Pelews. In a second collection from this locality we got three green-headed specimens; and the last collection (Capts. Heinsohn and Peters) contains ten specimens, all with greenish-blue heads.

From this excellent and instructive series we learn that we were quite mistaken in supposing the green-headed birds to be the young of *H. albicilla*, and that they belong to a distinct species, which we are not able to distinguish from the widely distributed *H. chloris*. We have before us five old specimens from India and Java which agree in every respect with them. The blue of head and back in some specimens changes more or less into bluish green; but there are all sorts of intermediate forms between the birds with blue and those with green back; the black band through the eyes and round the nape, aswell as the white occipital spot, are also more or less developed, the feathers of the former are more or less tipped with greenish blue. Three other specimens show certain signs of the young bird, in having the feathers of the sides of neck and breast, as well as those of the white neck-collar, with narrow dark edgings, giving them an undulating appearance; in these the whole head above is darker and of a dull olive-green; in one the white mark behind the nostrils is tinged with pale buff. Two younger specimens with quills not full-grown, and tail-feathers, and short hornish-white-tipped bills, so characteristic of young Kingfishers generally, resemble altogether the young of the true *chloris*. The black surrounding the nape forms a broader patch; the line above the loral region, as well as the breast and sides of belly, are tinged faintly with buff, and bear narrow blackish margins.

We must remark that the Pelew specimens seem to be generally

of a larger size; but after comparing them with the valuable measurements given by Prof. Schlegel, as reproduced hereafter, we see no necessity for separating them as a distinct species, though, perhaps, some naturalists, not having specimens enough at their disposal, might be willing to do so.

H. chloris breeds on the Pelew Islands; the collection contains a single egg, which is of a uniform white.

A closely allied species is our *H. cassini* (Orn. Centr. Polyn. p. 40; Cass. Un. St. Expl. Exp. pl. 16. f. 1), which the excellent monographer of the Kingfishers declares to be "certainly identical" with *H. sacra*. This he must allow us to doubt. We have examined extensive series of *H. sacra* from the Navigators' and the Tonga group, but have never seen any authentic specimen from the Viti group belonging to that species. All the specimens from the latter group were found to belong to *H. cassini*; so we are of opinion that this species will prove to be peculiar to the Vitis.

Long al.	caud.	rostr.	Lat. rostr.	Tars.	Dig. med.	
4 1-4 6	2 6-3 0	21 -25	7½-8	7	8½	ad., Pelew ... (13 spec.).
3 7-3 9	1 7-2 0	14½-15	6 -6½	...	...	juv., Pelew ... (3 spec.).
3 9-4 0	2 0-2 5	16 -20	...	...	...	Philippines ... (8 spec.), ap. Schleg.
3 11-4 1	2 6	18 -20	...	...	...	Bangka ..... (4 spec.), ap. Schleg.
4 0-4 2	2 6-2 7	19 -21	...	...	...	Java..... (3 spec.), ap. Schleg.
3 10	2 5	19	6	...	...	Java .... Brem. Mus.
3 11-4 0	2 5-2 6	18 -19	...	...	...	Borneo ..... (3 spec.), ap. Schleg.
3 11-4 1	2 6-2 7	18 -19	...	..	...	Timor ..... (3 spec.), ap. Schleg.
4 2	2 5-2 7	17 -20	...	...	...	Halmahera . (10 spec.), ap. Schleg.
4 1	2 7	19	...	...	...	Banda ..... (1 spec.), ap. Schleg.
4 0-4 3	2 5-2 9	18 -20	...	...	...	Amboina..... (4 spec.), ap. Schleg.
4 3	2 7	21	...	...	...	Ceram ..... (2 spec.), ap. Schleg.
3 10	2 5	20	...	...	...	New Guinea . (1 spec.), ap. Schleg.
3 10	2 5	19	6½	...	...	ad., E. Indies (1 spec.), Brem. Mus.
3 5	...	12	6	...	...	juv., E. Indies (1 spec.), Brem. Mus.
3 11	2 5	20½	6½	...	...	East Africa ... (1 spec.), Brem. Mus.

6. MYZOMELA RUBRATRA, Less.; Hartl. P. Z. S. 1867, p. 829; H. & F. *ibid.* 1868, pp. 5 and 116.

Six specimens from the Pelews (*Capts. Heinsohn and Peters*), and eight from Uap (*Kubary*). Amongst the latter there are three specimens, marked by Mr. Kubary as females ("breeding-season"), which agree with the description of the young bird given by us (P. Z. S. 1868, p. 5). They are of a dark olive-brown, intermixed more or less with red feathers; in some nearly the whole head and underparts are red, which shows these variations to be clearly signs of imaturity. Probably the adult female in full dress does not differ from the male.

Long. al.	caud.	rostr.	tars.	
2″ 7‴–2″ 10‴	20‴–24‴	6‴–7¼‴	9–10‴	(13 spec.).
2 4½	20	6	9	jun.

"Umel" of the natives (*Kubary*).

Mr. Kubary has also sent a nest, said to be of this species. It has a cup-shaped form, is deeper than broad, and was placed between the furcation of a small twig. It consists of stems of grass connected with cobwebs, and is somewhat loosely constructed.

A very interesting account of this species on Ualan is given by v. Kittlitz (Denkwürdigkeiten einer Reise, &c. i. 1858, pp. 364 & 381).

7. Psamathia annæ, Hartl. & Finsch, P. Z. S. 1868, pp. 5 & 116.

One specimen from Pelew (*Capt. Heinsohn*).

8. Zosterops semperi, Hartl.; H. & F., P. Z. S. 1868, p. 117.

Two specimens from the Pelew Islands (*Capt. Heinsohn*). In one, the chin and throat are rather of a sulphur-yellow. The nearest ally is *Z. meyeni*, Bp., which is smaller, and has a narrow black loreal stripe, and a yellow rump.

9. Zosterops hypolais, n. sp.

Minor. *Supra in fundo dilute cinerascente pallido virescente lavata, subtus pallide flavescens, pectore abdomineque cinerascenti-sordidulis; subalaribus albis; subcaudalibus dilute flavis; remigibus et rectricibus nigricantibus, dorsi colore marginatis; annulo periophthalmico minus distincto; pedibus plumbeo-nigricantibus.*

Upper parts of a pale greyish green, throat and under tail-coverts a pure but very pale whitish yellow; breast and abdomen of a mixed pale grey and pale yellow; wing- and tail-feathers pale blackish, margined with the greenish colour of the back; under wing-coverts and inner margins of remiges white; eye-ring indistinct; beak fuscous, the under mandible paler, except at the tip; feet plumbeous.

Long. tot. c. 4″, rostr. a fr. 5‴, al. 26‴, caud. 18‴, tars. 9‴.

Mr. Kubary has sent three specimens of this interesting new *Zosterops* from the island of Uap, which agree with each other. The absence of a distinct white eye-ring is the principal feature of this dull-coloured species. *Z. conspicillata*, Kittl., from Guaham, is its nearest ally, but is distinguished by the white front and eye-ring.

10. Zosterops oleaginea, n. sp.

Major. *Tota oleagineo-virescens, subtus parum dilutior, nonnihil flavo-fulvescente lavata; regione parotica nigricante; annulo periophthalmico niveo; remigibus et rectricibus fusco-nigricantibus, dorsi colore limbatis; rostro infuscato, mandibula flavida, apice fusca; pedibus pallidis.*

General colour a deep oil-green, with a decided fulvous hue; underparts a little paler, and a little more yellowish; eye-ring satin-white; ears blackish; upper and under tail-coverts with a slight rufous tinge; wing- and tail-feathers blackish, with oil-green

margins; under wing-coverts whitish grey; beak fulvous, under mandible, except at the tip, yellowish; feet pale, probably yellow; iris reddish white.

Long. tot. circa 4″ 7‴, rostr. a fr. 6½‴, al. 2″ 7‴, caud. 1″ 8‴, tars. 10‴.

The colouring of this typical species of *Zosterops* is quite unique, and does not resemble that of any other.

The collection contains three specimens, male and female, discovered and sent by Mr. Kubary from the island of Uap.

11. Zosterops finschi, Hartl.

Tephras finschi, Hartl. P. Z. S. 1868, p. 6, pl. 3, and *ibid.* p. 117.

One specimen from Pelew (*Capt. Heinsohn*).

On comparing again this curious bird with the allied Zosteropine members, we have come to the conclusion that *Tephras* can be considered only a subgeneric division of *Zosterops*. The wings, having the first quill-feather spurious, are the same as in true *Zosterops*, the bill corresponds with that of others (for instance, *Z. oleaginea*, which also has a somewhat rotundate tail). The want of a white eye-ring is the only point by which *Tephras* could be separated.

A near ally seems to be *Z. cinerea*, Kittl., from Ualan.

12. Turdus obscurus, Gmel.; Finsch, Journ. of Orn. 1863, p. 34.

Turdus pallens, Pall.
Turdus pallidus, Naum. (not Gmel.).

One specimen from the Pelews (*Capt. Heinsohn*), where this species has not yet been recorded.

13. Rhipidura versicolor, n. sp.

Supra fusca; fronte et sincipite læte rufis; gula alba, infra nigro-circumdata; pectore albido nigroque maculato; abdomine pallidius fusco, medio albicante; tectricibus caudæ superioribus subcaudalibusque rufis; remigibus fusco-nigricantibus, tectricibus alarum dorso concoloribus; subalaribus albidis; rectricibus obscure fuscis, late albo terminatis, 4 mediis basi rufis; rostro et pedibus fuscis.

Upper parts a rich brown with a slight reddish tinge; forehead bright rufous; upper and under tail-coverts rufous; throat white, margined underneath by an irregular jugular band of pure black; pectoral plumes black, broadly margined with yellowish white; middle of abdomen whitish, sides of a paler olive-brown; under wing-coverts whitish; wing-feathers blackish brown; tail-feathers brownish black, all largely tipped with white, the four middle ones rufous at the base, the white terminal spots becoming smaller towards the middle; beak fuscous, the under mandible paler except at the tip; feet fuscous.

Long. tot. circa 5″ 9‴, rostr. a fr. 4½‴, al. 2″ 6‴, caud. 3″ 3‴, tarsi 8‴.

Three specimens, collected by Mr. Kubary at the island of Uap. This typical new species resembles much *Rh. lepida*, nob. (from Pelew), and *Rh. torrida*, Wall., but may be distinguished at once from both by its tail-feathers being largely tipped with white.

"'Atabrue' of the natives" (*Kubary*).

A nest sent by Mr. Kubary in form and structure resembles much that of *Rh. nebulosa*, as described by us (Orn. Centr. Polyn. p. 87).

14. MYIAGRA ERYTHROPS, H. & F., P. Z. S. 1868, pp. 6 & 117.

One specimen from the Pelews (*Capt. Heinsohn*), not different from the specimens already received. In this specimen not only the front, but also the forehead to the anterior eye-margin is of a vivid rufous.

15. MONARCHES GODEFFROYI, Hartl., P. Z. S. 1867, p. 829, pl. xxxviii.

Eleven specimens in the three different plumages as figured, all collected by Mr. Kubary on the island of Uap.

Three specimens, white beneath and above, with black head, quills, and tail, agree with the description of the old bird and the figure in front. These are marked as males by the collector, and seem to represent the full-plumaged bird.

Two specimens, marked as female, have a broad white collar round the neck; the remainder of the under-surface is black, like the specimen represented in the middle figure, but the mantle is throughout black.

Besides, there are six specimens in the fulvous plumage, like the figure in the background. Our description of this stage being somewhat short and imperfect, we thiuk it necessary to give a more complete one, as follows:—

Supra cineraceo-rufescens; pileo et nucha sordide cinereis, uropygio et supracaudalibus dilute rufescentibus; alarum tectricibus remigibusque fuscis, rufo marginatis; subcaudalibus et subalaribus albido-rufescentibus; subtus dilute rufescens, gula et abdomine medio magis albicantibus; oculis pallido rufo circumdatis; rectricibus fusco-nigricantibus, macula apicali alba, extimæ latius albo terminatæ pogonio externo pallide rufulo; rostro fuscescente, basi pallido; pedibus nigricantibus.

Back rufescent grey; head above dark cinereous, sides of head rufescent; a pale fulvous ring round the eye; posterior part of back and upper tail-coverts light rufous; wing-coverts, tertiaries, and scapularies dark fuscous, with broad rufous margins; in the primaries these margins are reduced to an almost imperceptible narrowness; tail-feathers dark fuscous, with a white terminal spot; in the outer this white spot is much larger, and the external vane is pale reddish; underparts light rufous; throat and middle of abdomen rather whitish; under wing- and under tail-coverts whitish with a more or less rufescent tinge; feet bluish; beak brownish, pale at the base; eyes black.

The rufous colour of the underparts varies in intensity, being in some specimens paler and mixed with whitish on the middle of vent, in others uniform cinnamon-rufous or dark rufous.

According to Mr. Kubary, who notes these specimens as males, they belong to a different species; but we are quite sure that they are really the young of *M. godeffroyi*. There is one specimen which shows undoubted signs of change from the red plumage into the black, having the head here and there intermixed with black feathers; the middle tail-feathers are already black; and the cinnamon of the rump and upper tail-coverts is varied with white.

Long. al.	caud.	rostr. a fr.	lat. rostr.	tars.	
3″ 2‴	2″ 9‴	6½–6¾‴	3‴	10–11‴	♂ (3)
3 0 –3″ 2‴	2 8	—	3–3¼	—	♀ (2)
2 11 –3 1	2 7–2″ 9‴	6½–7	—	—	juv. (6)

The black and white bird is the "Gigi" of the natives; the young rufous bird is called "Golai."

16. CAMPEPHAGA NESIOTIS, n. sp.

Jun. *Supra rufescenti-fusco fulvoque sordide varia; pileo nuchaque cinerascentibus; superciliis rufis; uropygio et supracaudalibus dilute rufo fuscoque transversim notatis; gastræo dilute cinnamomeo-rufo, pectore fasciolis rarioribus strictissimis nigris notato; tectricibus alarum minoribus dorso concoloribus; majoribus, remigibus tertiariis scapularibusque fusco-nigricantibus, late rufo marginatis, majorum limbo externo strictissimo areaque majore pogonii interni rufis; subalaribus unicoloribus rufis; rectricibus duabus intermediis fuscis apice fulvo marginatis, lateralibus fuscescenti-nigris macula apicali majore fulva, extimæ pogonio externo fulvo, nigro marginato; rostro et pedibus nigris.*

Long. tot. circa 9½″, rostri 10½‴, alæ 4″ 5‴, caudæ 3″ 10‴, tarsi 12‴.

Back rich brown, indistinctly mottled with fulvous; head above and nape darker and more greyish; eyebrows and frontal plumes rufous; posterior part of back and upper tail-coverts transversely variegated with rufous and dark brown; beneath light rufescent or fulvous, some narrow black bands on the breast; under wing-coverts and under tail-coverts of a uniform light rufous; wing-coverts like the back; scapulars and smaller wing-feathers blackish, with broad rufous margins, primaries with a very narrow rufous external margin, the inner vanes of all from the base with a larger rufous marginal space; the two middle tail-feathers brown, margined with rufous at the tip, the lateral ones blackish with a larger fulvous terminal spot, the external one black with a very broad apical part and a narrow longitudinal band on the outer vane light rufous; bill and feet black.

Two specimens from the island of Uap, discovered and sent by Captain Peters. Both specimens are alike, and in the rufous dress of the young bird or female. The old bird will certainly show a

quite different coloration, but nevertheless prove to be specifically distinct. At least, all our endeavours to unite these rufous-coloured specimens with any of the known species have been unsuccessful. They have, however, great resemblance to the females of *C. melæna*, Müll., and some other Moluccan species.

"'Astang' of the natives; very rare" (*Kubary*).

17. Campephaga monacha, n. sp.

Saturate cæsia; plumis supranasalibus lorisque latius nigris; tectricibus alarum remigibusque nigris, dorsi colore marginatis, his pogonio interno a basi ultra medium latissime albo marginatis; subalaribus indistincte fasciatis; subcaudalibus limbo apicali vix conspicue albidis; rectricibus intermediis obscure cæsiis, apice late nigris, reliquis nigris, omnibus limbo apicali albidis; rostro et pedibus nigris.

Jun. *Supra sordide et obsolete griseo-fuscescens, hinc inde nigro fulvoque transversim notata; subtus fulva, maculis nigris subtriquetris rarius variegata; gutture immaculato; remigibus nigricantibus, dilute rufescente marginatis; rectricibus mediis sordide rufulis, lateralibus fusco-nigricantibus, apice margineque dilute rufescentibus; subalaribus et subcaudalibus læte et dilute fulvis, his striis scaparum rarioribus nigris; rostro et pedibus nigricantibus.*

Long. tot. circa 8″ 6‴, rostri a fr. 7½‴, al. 3″ 8‴, caud. 3″, tarsi 9½‴.

Ad. All over of a dark bluish grey; lores and a small frontal band velvet-black; throat somewhat darker; wing-feathers black, coverts and smaller remiges with a broad margin of bluish grey; this margin is very narrow on the greater ones, and does not extend to the tip; an oblique white belt on the inner vanes; intermediate tail-feathers dark bluish grey with broad black tips, lateral ones black, all with a narrow whitish terminal margin; under wing-coverts indistinctly barred; under tail-coverts bluish grey, with a very narrow apical margin of white; bill and feet black.

No species of the widely distributed group of Campephagine birds has been yet recorded from the Pelew Islands. For the discovery of this interesting new species we are indebted to Capts. Heinsohn and Peters; the first-named gentleman sent the young, the last-named the old bird, from the Pelews.

This species comes nearest to *C. morio*, Temm., from Celebes; but the latter is larger, and has the sides of head, chin, and throat black.

18. Artamus leucorhynchus (Gmel.); H. & F., P. Z. S. 1868, p. 116.

One specimen agreeing with the one mentioned by us from the Pelews; but the bill is of a delicate light cobalt-blue, with dark tip.

19. Rectes tenebrosus, H. & F., P. Z. S. 1868, pp. 6 & 117.

Two specimens from the Pelew Islands (*Capt. Peters*) agreeing

with the type-specimen described by us. We are now of opinion that this plumage is not that of the young bird, but of the old.

Long. al.	caud.	rostr.	tars.
3″ 6‴–3″ 8‴	2″ 6‴–2″ 7‴	8‴	12‴

20. Calornis kittlitzi, F. & H.; Hartl. P. Z. S. 1867, p. 830; H. & F. *ibid.* 1868, pp. 7 & 117.

Three specimens from Mackenzie Island (*Capt. Peters*), and two from Uap (*Kubary*), where this species had not been previously observed.

One specimen, determined as female by Mr. Kubary, agrees in colour with the old male; a young one (marked as male) is of a uniform sooty brown, with slight metallic reflexions on the upper parts. "Iris yellow" (*Kubary*).

The dimensions vary very much in this species, but do not equal those of the allied *C. corvina*, Kittl., from Ualan.

Long al.	caud.	rostr.	tars.	
4″ 4‴–4″ 10‴	2″ 8‴–3″ 3‴	8½–9½‴	12 –13‴	(Pelew, 9 spec.)
4 7 –5 0	2 9 –3 4	8½–9	13½–14	(Mackenzie, 9 spec.)
4 6 –4 8	2 7 –3 0	9 –9½	13 –14	(Uap, 2 spec.)

21. Cuculus canorus, L.; Swinh. P. Z. S. 1863, p. 264.

Cuculus telephonus, Heine, jr., Journ. f. Orn. 1863, p. 352.

An old specimen from the Pelew Islands (*Capt. Heinsohn*) proves to be specifically identical with our common Cuckoo. In comparing this specimen with an old male from Germany, we can notice only that the white underparts are tinged very faintly with yellowish, and that the dark cross bands on the under tail-coverts are less marked. The zigzags on the anal region are absent.

I have also seen in the Leyden collection a specimen labelled "Luçon," which was entirely similar to the European bird.

Long. al.	rectr. med. caud.	culm.	rictus.	tars.	dig. ext.	
7″ 10‴	6″ 1‴	10‴	13½‴	9½‴	10½‴	(Pelew.)
8 1	6 4	9½	13½	9½	10	(Germany.)

The occurrence of the Common Cuckoo in the Pelews is a new fact in the geographical distribution of this species.

22. Cuculus striatus, Drapiez; Schleg. Mus. P.-B. *Cuculi*, p. 7.

Cuculus himalayanus, Swinh. P. Z. S. 1863, p. 265.

Three specimens from the Pelews (*Capts. Heinsohn and Peters*) are nearly in full plumage—one changing the feathers of the upper parts from brown into dark slate, and two young ones in the dark rufous plumage barred with dark. I have for comparison only an old specimen from Amboina at hand, which shows no difference.

Long. al.	rectr. med.	culm.	rictus.	tars.	dig. ext.	
7″ 1‴	5″ 1‴	8½‴	12‴	7½‴	9½‴	(ad., Pelew.)
7 3	5 7	8	12	8½	9	(juv., Pelew.)
7 5	5 5	8½	12	8½	9	(juv., Pelew.)
7 0	5 4	8½	12	7½	8½	(ad., Amboina.)

New to the Pelews.

Peale's *C. fucatus*, from Mangsi, in the Sooloo archipelago (*C. tenuirostris*, Cass. Atl. pl. 21. f. 1) belongs not to this species, but to the smaller *C. micropterus*, Bl. (Schleg. *Cuculi*, p. 12 = *C. tenuirostris*, Cab. & Heine, Mus. Hein. p. 39, nec *C. tenuirostris*, Müll.).

23. Ptilinopus pelewensis, H. & F., P. Z. S. 1868, p. 7.

Six specimens from the Pelews (*Capts. Peters and Heinsohn*), agreeing exactly with the description given by us, as cited above. The outermost secondaries (the so-called tertiaries) have an acute angulated shaft-end spot of brilliant violet-blue; the under tail-coverts are bright purplish red, with narrow bright orange edgings; feet dark blood-red; bill lead-coloured, with greenish-white tips.

Young bird. Green, with narrow yellow edgings on the tectrices and scapulars; head above also green, with a pale yellow supercilium; underparts dirty olive-green; vent, anal region, and under tail-coverts straw-yellow; on the vent some orange feathers; tail green, with a whitish patch on the inner webs above the end, forming an irregular cross band; feet and bill dark.

Long. al.	caud.	rostr.	
4″ 10‴–5″	2″ 7‴	6–6½‴	(5 spec.)
4 8	2 4	6	(juv.)

24. Carpophaga oceanica (Less.); Hartl. P. Z. S. 1867, p. 830.

Carpophaga pacifica, H. & F., P. Z. S. 1868, p. 7.

One old specimen from the Pelew group (*Capt. Heinsohn*), agreeing exactly with the figure of Kittlitz (Kupfert. 33. f. 1), who observed the bird on the island of Ualan (Denkwürdigk. i. p. 377). We must remark that none of the specimens we have examined from this group show the ferruginous-vinaceous tinge on the crop and breast, although this tinge is sometimes also wanting in specimens from the Navigator and Friendly groups. But, what is more significant, the Pelew specimens have the grey on the head and hind neck much darker; besides, the under wing-coverts are brownish black, whereas in *C. pacifica* from Central Polynesia they are of a dark ashy grey. The chestnut-red on the vent, anus, and under tail-coverts appears to be also much darker in Pelew specimens. Therefore we incline to believe that the *Carpophaga* from the north-western Pacific Islands may form a distinct species—the *Columba oceanica* of Lesson; but before we can settle this question with certainty we must wait for further examination, based upon more specimens.

25. Phlegœnas canifrons, n. sp.

Supra olivaceo-virescens, nitore nonnullo metallico; occipite, collo postico et interscapulio læte ferrugineis; fronte et sincipite, capitis, colli et pectoris lateribus cinereis; gula et collo antico magis albicantibus; alis dorso concoloribus, area majore scapulari pulchre violaceo-purpurascente; remigibus fuscis, pogonio

interno a basi inde pro majore parte rufis; subalaribus rufis; abdomine sordide griseo-fuscescente; rectricibus intermediis dorso concoloribus, reliquis intense fuscis, ante apicem rufescentem obscurius adumbratis; rostro nigricante; pedibus rubris.

Back, wings, upper tail-coverts, and median tail-feathers of a rich olive-bronze green; forehead, top and sides of the head, sides of neck, and breast plumbeous grey; throat and fore neck vinaceous whitish; posterior part of head and neck and interscapulars of a rich rufous; a large shoulder-spot purplish violet; abdomen of a dirty and dark greyish brown; wing-feathers blackish, the inner vane from the base for more than two thirds rufous, which colour does not quite reach to the shaft, the outer vane with a reddish tinge for the same extent; under wing-coverts rufous; lateral tail-feathers fuscous, somewhat darker before the slightly rufescent tip; the middle ones more like the back; beak blackish; feet red; nails brown.

Long. tot. circa 10″, rostr. a fr. 8½‴, al. 4″ 2‴, caud. 2″ 9‴, tars. 1″.

A single specimen, collected by Capt. Peters on the Pelews, and apparently in full plumage. This is a very remarkable species, distinguished by the grey of the forehead and along the sides of the neck, and by the cinnamon-rufous of the occiput and hind neck, besides by its small size.

26. Phlegœnas yapensis, n. sp.

Jun. av. *Supra sordide rufa; pileo unicolori; dorsi et uropygii plumis, alarum tectricibus, scapularibus, remigibus tertiariis et supracaudalibus fuscis, large rufo marginatis; pectore cinerascente rufoque nebuloso; abdominis plumis fuscescentibus, apice rufescentibus; subalaribus obscure fusco rufoque variis; subcaudalibus fusco-nigricantibus; area scapulari obscure violaceo-purpurascente; remigibus majoribus fuscis, margine apicali extimo rufo; rectricibus obscure rufis, ante apicem late nigris; rostro (ut videtur) flavido, pedibus nigricantibus.*

Juv. *Dorso nitore virescenti-metallico valde conspicuo; alarum tectricibus scapularibusque minus virescentibus; capite toto rufo; pectore et abdomine obsolete rufescentibus, illo nitore nonnullo subviolacescente lavato; subalaribus et subcaudalibus obscure rufis; cauda ut in ave modo descripta; rostro nigricante.*

Long. tot. circa 10″, rostri 7½‴, al. 5″ 3‴, caud. 3″ 6‴, tars. 13‴.

Two immature specimens. The elder bird (marked as male) has the upper and lateral part of the head light rufous; the feathers of the whole back, the wing-coverts, the scapularies, and tertiaries are of a dark brown, with broad margins of pale rufous; a large shoulder-spot purplish violet, mixed with pale rufous; primaries of a uniform blackish brown; tail-feathers light rufous, with a broad black band before the tip; the throat seems to be of a dirty rufescent colour; the feathers of the breast pale bluish grey margined with rufous, those of the abdomen and under tail-coverts blackish, variegated with obsolete rufescent shades; under wing-coverts of an obscure mixture of

black and rufous; bill yellowish, darker round the base; feet plumbeous, with pale nails.

A *still younger bird* (marked as female) is rather differently coloured, the back being of a dark olivaceous green, with bronze reflexions; wing-coverts, tertiaries, and scapularies also more greenish, with broad rufous margins; no purplish shoulder-spot; the whole head light rufous; breast and abdomen of an indistinct olivaceous-rufescent hue; under wing-coverts rufous; tail as in the elder bird.

Long. al.	caud.	rostr.	tars.	dig. med.	
5″ 4‴	3″ 6‴	7½‴	14‴	11‴	(♂)
5 0	3 4	7	13½	11	(♀)

Mr. Kubary has sent only these two specimens, which unfortunately represent two different stages of the imperfect bird. The one marked as female shows some resemblance to the rare Pigeon from the Mariannes named by Bonaparte *Pampusana rousseaui*. Although neither specimen is in full plumage, we do not hesitate to introduce the species as new, as there are certain signs which lead us to expect that the old bird will prove its specific distinctness.

"The 'Arolit,' as the species is called by natives, is the only Pigeon inhabiting the island of Uap, and is of very rare occurrence there. The Arolit lives in the interior of the wood, far from the settlements of the natives" (*Kubary*).

27. Megapodius senex, Hartl. P. Z. S. 1867, p. 830; H. & F. *ibid.* 1868, p. 7.

Two old specimens from Pelew (*Capts. Peters* and *Heinsohn*), and the very young in the first plumage. This resembles very much the "*Alecthelia durvillei*," Less. (Voy. Coq. pl. 37), which is the young of *M. freycineti*; but the head and upper parts are dark olive-brown, the rump and caudal down red-brown; chin and throat yellowish; feet dark reddish brown.

The *Megapodius senex* is an excellent species, distinguished at once by the very small vivid-yellow bill, the brownish-grey crested cap, the yellowish or brownish legs, and black toes.

Long al.	caud.	rostr.	rict.	tars.	dig. med.	ung.
6″ 8‴	2″ 2‴	7‴	11‴	2″ 2‴	17‴	8‴
6 4	1 11	7	12	2 1	18	8

The collection contains also one egg of this species, which, in size, form, and coloration, is almost nearly undistinguishable from that of *M. pritchardi*, Gray. Length 2″ 9‴, breadth 1″ 8‴.

28. Gallus bankiva, Temm.

Capt. Peters has sent from the Pelews a single female specimen, but unfortunately he does not state whether the Jungle-fowl lives in a wild state on the islands, or as in Uap, as Mr. Kubary remarks (*in litt.*), only in a half-wild state.

The specimen agrees entirely with a hen from Sumatra; only the

golden-yellow feathers on the hind neck are paler; besides, it is somewhat paler in colour.

Long. al.	caud.	rostr.	rict.	tars.	dig. med.
7″	5″ 1‴	6½‴	13‴	26‴	18‴

"Mallett" of the natives.

Wild Jungle-fowls have not yet been recorded from the Pelews. Mr. Kubary notices the very rare occurrence of half-wild fowls in the interior of Uap.

29. CHARADRIUS FULVUS, Gmel.; H. & F., P. Z. S. 1868, pp. 8 & 117.

One specimen from Pelew (*Capt. Heinsohn*), two from Mackenzie (*Capt. Peters*), and three from Uap (*Kubary*).

As regards the specific distinctness of this species from *Ch. pluvialis* we must refer to what we have said (Journ. f. Orn. 1870, p. 139). The specimens contained in this collection confirm our opinion, as will be shown in the following measurements:—

Long. al.	caud.	rostr.	tars.	tib. med.	dig. med.	
6″ 0‴–6″ 4‴	2″ 0‴–2″ 3‴	10–11‴	18–20‴	9–11‴	10–11‴	(Uap.)
6 4 –6 7	2 1 –2 4	10–11	21	10–12	12	(Mackenzie.)
6 0	2 0	10	19	9	10½	(Pelew.)

"'Kuling' of the natives" (*Kubary*).

30. STREPSILAS INTERPRES (L.); Hartl. P. Z. S. 1868, p. 831; H. & F. *ibid.* 1868, p. 8.

Specimens from Pelew (*Capt. Heinsohn*), Mackenzie (*Capt. Peters*), and Uap (*Kubary*). Some of them still show signs of the summer plumage; others are in the perfect winter dress.

"'Kuling' of the natives" (*Kubary*).

31. ARDEA SACRA, Gmel.; Hartl. P. Z. S. 1867, p. 831; H. & F. *ibid.* 1868, pp. 8 & 118.

Fourteen specimens from the Pelews (*Capt. Peters*) and Uap (*Kubary*); amongst them eight slate-coloured specimens, five white ones, and one in the reddish-brown plumage of the young bird.

The great variation in colour and size which this species exhibits we have already explained several times, especially in our paper on the birds of the Tonga Islands (Journ. f. Orn. 1870, p. 136). We have also stated that the white birds are by no means young ones. The large collection before us confirms all these statements fully.

There are two slate-coloured females, one with a narrow interrupted, the other with a broad well-defined white stripe on chin and throat, shot in December 1870, on which Mr. Kubary notices on the label, "ovaries with full-developed eggs, some more than 2‴ long;" whereas he remarks on a uniform white male shot at the same time, "testicles very large." This latter male specimen is in full plumage, with full-grown scapular feathers, whereas one of the slate-coloured females shows still some moulting-feathers.

Two white females, shot in September, have the wings mixed more or less with slate-coloured feathers.

One female, shot in December, is strongly in moult, especially on the neck, where the new dark slate-coloured feathers predominate over the old reddish-brown feathers, the remains of the young plumage.

In one slate-coloured male, shot in December, there is only a small white spot on the middle of the throat. Another male, shot in September, has no white feathers at all. The dimensions are, as usual, very variable.

Long. al.	rostr.	tars.	dig. med.	
9″ 9‴–11″	3″ 1‴–3″ 7‴	2″ 9‴–3″ 3‴	23–38″	(12 spec. from Uap.)

Mr. Kubary has observed both the dark and white bird fishing in company. These birds frequent chiefly the lagoons, and roost on the mangroves near the shore. The nest consists only of an excavation of the ground, bordered by stems of grass (?). The natives distinguish the black bird under the name "Khau," the white as "Wunensy," and believe the different colorations to be sexual.

Concerning this species see also v. Kittlitz (Denkwürd. einer Reise, i. p. 368), who observed the bird on Ualan.

32. Ardea sinensis, Gmel.

Ardea lepida, Horsf.

Six specimens from Uap, collected (in the beginning of October) by Mr. Kubary and Capt. Peters.

"Irides yellow" (*Kubary*).

They agree in every respect with specimens from Java.

Long. al.	caud.	rostr.	tars.	dig. med.
4″ 7‴–5″ 1‴	19–20‴	22–23‴	20–21‴	17–18½‴

The Western Carolines are a new locality for this widely-distributed species.

The "Thogil," as the bird is called by the natives, resorts chiefly to the mangrove-scrub on the shore.

33. Nycticorax griseus (L.).

One specimen from Uap (*Kubary*) in the spotted plumage of the young.

Mr. Kubary notices this species as a very rare visitor on the island of Uap during the north-east monsoon.

Long. al.	caud.	rostr.	rict.	tars.	tib.	dig. med.
10″ 6‴	3″ 9‴	2″ 5‴	3″ 4‴	2″ 5‴	6‴	2″ 4‴

"The natives call this 'Orror;' it is very rare" (*Kubary*).

34. Nycticorax manillensis, Vig.; Schleg. Mus. P.-B. *Ardeæ*, p. 60.

Nycticorax caledonicus, H. & F., P. Z. S. 1868, p. 117 (Pelew).

Two old and a young specimen from the Pelew Islands (*Capt. Heinsohn*).

In our last list of the birds of the Pelew Islands we have inserted this species wrongly as *N. caledonicus*, from which it seems to differ specifically in having the back, shoulders, and wing-coverts of a much darker cinnamon-castaneous; the neck is also darker. The young birds differ also a good deal from the young of *N. caledonicus*, having the sides of head and the front of the neck brown, each feather with a narrow white shaft-stripe.

Long. al.	caud.	rostr.	rict.	tars.	tib.	dig. med.
10″ 3‴–11″	3″ 7‴–3″ 11‴	2″ 6‴–2″ 9‴	3″ 4‴–3″ 8‴	3″–3″ 2‴	12–15‴	2″ 4‴–2″ 6″

35. Numenius phæopus, Lath.; Hartl. P. Z. S. 1867, p. 831; H. & F. *ibid.* 1868, p. 8.

Two specimens from Uap (*Kubary*), and one from the Pelews (*Capt. Peters*).

There is no difference between these and European specimens.

"Lives in great swarms; roosts during night on trees" (*Kubary*).

36. Tringa acuminata, Horsf.; H. & F., P. Z. S. 1868, p. 8.

One specimen from Pelew (*Capt. Heinsohn*), agreeing with the specimen received formerly thence, but smaller. Similar to Australian specimens.

Long. al.	caud.	rostr.	tars.	tib.	dig. med.
5″ 2‴	2″ 1‴	11½‴	14‴	6‴	11½‴
4 10	2 0	11	12½	7	10

37. Tringa minuta, Leisl.; H. & F., P. Z. S. 1868, p. 8.

One specimen in winter dress from Pelew (*Capt. Peters*).

38. Actitis incanus (Gmel.), F. & H. Orn. Centr. Polyn. p. 182.

One specimen from Uap (*Kubary*) in the barred summer plumage. Not yet recorded from this locality.

Long. al.	caud.	rostr.	tars.	dig. med.	
6″ 5‴	2″ 5‴	18‴	14‴	11½‴	(Uap.)
6″ 2‴–6 8	2″ 5‴–2 9	16½–17	13½–15	11½–12	(Upolu, 6 spec.)

Specimens from the Navigators, (Upolu), shot in September by Dr. Gräffe, bear different plumages. One has still the banded summer dress; others have already partially or totally assumed the uniform winter dress. Von Kittlitz observed this species on Ualan, in the Eastern Carolines (*Tringa glareola*, Denkwürd. i. p. 365).

39. Actitis hypoleucus, L.; H. & F., P. Z. S. 1868, p. 8.

One specimen from Pelew (*Capt. Peters*).

40. Rallina fasciata (Raffl.).

Gallinula euryzona, Temm.

Rallina fasciata, Hartl. P. Z. S. 1867, p. 831; H. & F. *ibid.* 1868, p. 7.

Three old and one young specimens (*Capts. Heinsohn* and *Peters*) from Pelew.

There is no difference whatever between these and specimens from Java and Malacca.

Long. al.	rostr.	tars.	dig. med.
4″ 5‴–4″ 9‴	9–9½‴	17½–19½‴	12–13‴

41. RALLUS PECTORALIS, Less.

Rallus philippensis, Hartl. P. Z. S. 1867, p. 831.
Rallus pectoralis, H. & F. *ibid.* 1868, pp. 8 & 117.

Three species from the Pelew Islands (*Capts. Heinsohn* and *Peters*). In one the cinnamon cross band on the breast is well marked, in the other barely visible; in a younger one it is wanting totally. In one the black feathers on the hind neck have only white marginal spots; in the other they are barred distinctly with white.

Long. al.	caud.	culm.	tars.	dig. med.	
5″ 3‴	2″ 4‴	13½‴	19‴	17‴	(Pelew.)
4 9	—	12½	17	15	„
4 4	—	11	17½	16	„

42. ORTYGOMETRA QUADRISTRIGATA, Horsf.; H. & F., P. Z. S. 1868, p. 8.

Old and young birds from Pelew (*Capt. Peters*) and Uap (*Kubary*). This latter is a new locality for this extremely widely distributed species.

As we have already shown in our work on Central-Polynesian Ornithology (p. 166), specimens from the Navigators' Islands and Java agree in every respect.

The size varies considerably.

"Breeding-season in July and August. The bird, named by the natives 'Bal,' lives in the wooded region, and is here plentiful. It has a loud voice. Its nest is very roughly made in the grass. It is often attacked by the Galufs (*Hydrosaurus marmoratus*), a species of Lizard about 3 feet long." (*Kubary*.)

43. PORPHYRIO MELANONOTUS, Temm., var. PELEWENSIS, nob.

Porphyrio melanotus, H. & F., P. Z. S. 1868, p. 8 (Pelew); *id.* ibid. p. 117.

Four specimens from the Pelew Islands (*Capt. Peters*), which again prove the smaller size to be a constant character of the race of the Pelew group, as they have the wings and tarsus always considerably shorter. The bill and frontal shield vary as much as in *P. melanonotus*, with which in coloration it agrees perfectly. As in that species, the remiges show more or less a blue shining margin along the outer web; the blue patch on the humerus in some specimens is brighter. If the notice "legs yellow," given formerly by

one of M. Godeffroy's collectors, should be right, no doubt the *Porphyrio* of the Pelews would rank as a species; but we doubt this, because, so far as we can judge from the dried skins, the colour of the legs in life is red as in *P. melanonotus*.

We append for comparison measurements taken from eight specimens from Pelew, and seven of the true *P. melanonotus* from Australia and New Zealand.

Long. al.		caud.		rostr. incel. scut.		latit. scut.	rict.	tars.		tib.		dig. med.	
7″ 10‴– 8″ 3‴		2″ 9‴–3″ 2‴		2″ 1‴–2″		8‴	6½–13‴	15–17½‴		2″ 9‴–3″ 0‴		12–15‴	2″ 10‴–3″ 1‴*
9 7 –10 9		3 3 –4 1		2 3 –2 10		8 –11½	16–19	3 4 –3 9		15–22		3 1 –3 7	†

44. Anas superciliosa, Gmel., var. pelewensis, H. & F.

A. superciliosa, Hartl. P. Z. S. 1867, p. 832; H. & F. *ibid.* 1868, p. 8.

Two specimens from the Pelews (*Capt. Heinsohn*), which agree perfectly with specimens from New Zealand and Australia, except in their smaller size. Having examined four specimens, which all exhibit this peculiarity, we consider the Pelew bird to belong to a smaller race.

The superciliary stripe, sides of head, chin, and throat are a little more rufescent; but this cannot be noticed as a character of specific value, this tinge being in some specimens much paler, and almost the same as in certain specimens from New Zealand. The dark stripe from the angle of the mouth also varies in intensity, and is nearly altogether wanting in some specimens.

The two last-received specimens show another strange peculiarity, in two or three of the outer secondaries (the so-called tertiaries) having on their dark-brown outer web three or four longitudinal light-brown patches, forming sometimes a broad longitudinal stripe.

A. luzonica, Fras. (P. Z. S. 1839, p. 112), seems to be an excellent species, being described as having head and neck "*pallide castanea*," and a white cross band on the wings, formed by the white band of the tectrices of the secondaries.

Long. al.	caud.	rostr. a front.	Alt. max. ad bas.	Latit. max. ad apic.	Long. tars.	dig. med.	
′8‴–8″ 6‴	3″ 0‴	18 –19½‴	6–7‴	8½–9‴	15½–16‴	18–20‴	(Pelew, 4 ex.)
0 –9 6	3″–3 4	20½–22	8–8½	9 –9½	17 –18	21–23	(New Zeal., 6 ex.)

45. Puffinus dichrous, H. & F. Orn. Centr. Polyn. p. 244.

Procellaria obscura, Kuhl (nec Gmel., nec auct.), Zool. Beitr. iii. (1820) p. 147, t. xi. f. 11 (cap.); Temm. Man. d'Orn. ii. (1820), p. 808 (sol. descr.); Schleg. Mus. P.-B. *Procell.* (1863) p. 30 (syn. emend.).

Puffinus opisthomelas, var. *minor*, Hartl. P. Z. S. 1867, p. 382; H. & F. *ibid.* 1868, pp. 9 & 371; Finsch, J. f. Orn. 1870, p. 371.

? *Puffinus obscurus*, Degl. Orn. Europ. ii. p. 366 (syn. excl.); Degl. & Gerbe, *ibid.* sec. ed. p. 380.

? *Procellaria obscura*, Schleg. & Pollen, Rech. Faun. Mad. p. 144.

* Pelew. † Austr., New Zealand.

Upper parts, including wing and tail, sooty black; this colour extends from the angle of the mouth, bordering the eye beneath, to the middle of the ear-region; the sides of the neck and breast sooty greyish black, tipped narrowly with whitish; remainder of the underparts white; the central and lateral under tail-coverts sooty black, some of the former very narrowly margined at the apex with white; the anterior central under tail-feathers greyish black, towards the basal half whitish, and with broader white apical margins; under wing-coverts white, along cubitus and manus bordered with sooty-black feathers; the remiges on the inner web towards the base become paler brownish; the tectrices of the secondaries very faintly and narrowly tipped with whitish; there is a slight indication of a white line bordering the eye underneath; bill hornish, dark brown, tip paler; inside of tarsus, toes, and membranes pale hornish yellow; external toe and outside of tarsus dark blackish brown, lighter, into brownish yellow towards the basal half of tarsus; nails blackish; the tail is somewhat cuneate, the tips of the quills reach to about one third from the end of the tail.

In former collections from the Pelews we examined five specimens; this last collection contains six adult and two young examples, all collected by Capt. Heinsohn.

There exists little variation amongst these specimens; we notice only that in some specimens the under tail-coverts are throughout sooty black, in others the anterior lateral under tail-coverts are white at the greater basal portion of the inner web. The very faint whitish tips of the tectrices of the secondaries are in some specimens almost wanting; the sides of the thighs have sometimes a greyish dark mark.

The two nestlings are clothed uniformly with thick greyish-brown down, changing on the middle of the underparts into white. Coloration of feet as in old birds. The young from M'Kean's Island are precisely similar.

Through the kindness of Dr. Cabanis we received the type of our *P. dichrous* from M'Kean's Island (collected by Dr. Gräffe), and now deposited in the Berlin Museum. After a careful comparison, we have not the slightest doubt as to its identity with Pelew specimens. The type specimen of *P. dichrous*, the only one we ever received from the Central Pacific, has a little shorter wings. The anterior lateral under tail-coverts are white on the greater portion of the inner web, just as in some specimens from the Pelews. The coloration is quite the same.

In our previous memoirs on the Pelew birds we took this Petrel, although with some doubt, for *P. opisthomelas*, noticing the considerably smaller size. Having now examined about a dozen specimens from the Pelews, in comparison with the type specimen, we find the smaller size to be constant, and cannot unite them with those noticed by Mr. Coues, after the two specimens from Cape St. Lucas, Lower California (coll. Xantus) in the collection of the Smithsonian Institution, and the figure given by Mr. Elliot (Introd. B. N. Am. fig. head, natural size). In coloration there seems to exist no considerable

difference from *P. opisthomelas*: the dark colour extends in both below the lores and eyes; the under tail-coverts are fuliginous black, &c. In respect to colour our species is also closely allied with *P. anglorum*, Temm., but this latter has only the outer row of the under tail-feathers black on the outer web, and is nearly as large as *P. opisthomelas*.

To this last-named species belongs *Puffinus obscurus*, Vieill. Gal. Ois. t. 301 (tab. sol. excl. descr.).

We are not fully acquainted with the geographical distribution of *P. dichrous*, having only seen specimens from the Pelews and M'Kean's Island. Schlegel notices it from Bourbon, and also a specimen (said to be one of the types of Temminck's *P. obscurus*) from the Atlantic; but this latter locality requires confirmation.

This species is the *P. obscurus* of Kuhl, Temminck, and Schlegel, and perhaps of Degland and Gerbe, who confounded it, as nearly all authors do, with the true *Pr. obscura* of Latham and Gmelin. In respect to this latter very confused species we are able to give some notes, which perhaps will be of some use:—

PUFFINUS OBSCURUS (Gmel.).

Dusky Petrel, Lath. Gen. Syn. iv. p. 416 (Christmas Island).

Procellaria obscura, Gmel. S. N. p. 559 (ex Lath.); Bechst. Lath. Trans. iii. p. 364 (inaccur.); Lath. Ind. Orn. ii. p. 828; Vieill. Enc. Méth. i. p. 81 (ex Lath.); *id.* Gal. Ois. p. 230 (nec tab. 301).

Puffinus obscurus, Reichb. Schwimmvög. Novit. t. vi. f. 2250, 2251 (ex Mus. Dresd.); Bp. Consp. ii. p. 202 (ex Lath., syn. excl.); Verr. MS. (Madagascar); Hartl. Madag. p. 84 (excl. syn.).

Nectris gama (nec Bp.), Hartl. Madag. p. 84 (excl. syn.).

? *Procellaria obscura*, Schleg. & Pollen, Rech. Faune Madag. p. 161 (syn. *Nectr. gama*, Hartl.).

This species, black above, white beneath, may be distinguished at once by the uniform pure white under tail-coverts; the black on the upper parts does not reach beyond the loreal and auricular regions; the tarsus and feet are yellowish, with the external toe and outside of tarsus partially black.

M. Jules Verreaux, in his excellent manuscript notes, describes this species from Madagascar, Bourbon, and Mauritius, whence he received specimens through Telfair, Desjardin, and Sganzin. A specimen in the Stuttgart Museum, from Madagascar, has been referred by Dr. Hartlaub to *Nectris gama*; but the true *N. gama*, Bp. (Consp. ii. p. 202) is different, although a very doubtful species.

I have examined the Madagascar specimen in the Stuttgart Museum (labelled *P. baillonii*), and noticed the external lateral under tail-coverts on the outer web black.—F.

P. obscurus inhabits the Indian Ocean (Christmas Island, *Latham*; Madagascar, Bourbon, Mauritius, *Verr.*). As regards its occurrence in Europe, as first mentioned by Temminck ('Alpes du Piémont'), and America, we have no trustworthy evidence. Schlegel (Vogels van Nederland, p. 585) says, "several times obtained on our shores;" but later (Mus. P.-B. p. 30), "Je ne connais pas

d'exemple bien constaté que cet oiseau ait été observé sur les côtes d'Europe."

Indeterminable are the following references, usually referred to *P. obscurus*:—

Puffinus obscurus, Schleg. Vog. van Nederl. p. 585 (perhaps *P. assimilis*, G.); *id.* Rev. Crit. p. cxxxiii ("Nördliches Europa!").

Nectris obscura, Keys. & Blas. Wirbelth. Eur. p. 94 ("Mittelländisches Meer, Südküste Nordamerika's").

Puffinus obscurus, Linderm. (Vögel Griechenl. p. 171) and Krüper (Journ. f. Orn. 1863), belongs to *P. anglorum*, Ray, or the hardly different Mediterranean form *P. yelkuan*, Acerbi.

Puffinus obscurus, Gould (B. Eur. pl. 444), we have had no opportunity of comparing.

PUFFINUS ASSIMILIS, Gould, P. Z. S. 1837, p. 186; *id.* B. of Austr. vii. t. 59; Reichb. Schwimmv. f. 2600 (ex Gould); Gray, Gen. of B. iii. p. 647 (syn. *P. nugax*, Sol. MS.).

Puffinus nugax, Bp. Consp. ii. p. 205; Schleg. *Procell.* p. 31; Gould, Handb. B. Austr. ii. p. 458; Finsch & Hartl. Centr. Polyn. p. 242; Coues, Proc. Acad. Phil. 1864, p. 141.

Puffinus assimilis, Gray, Ibis, 1862, p. 244.

Puffinus obscurus, Gray, B. Trop. Isl. p. 55; Finsch, Journ. f. Orn. 1870, p. 371.

Like *P. obscurus*, but smaller; the under tail-coverts also uniform white; but the white of the underparts mounts up on the sides of the head, including loreal and auricular regions; tarsi greenish yellow, webs bright chrome-yellow.

In the Pacific seas of Australia and New Zealand.

[I was wrong in my note (cited above) in stating this to be the true *P. obscurus*, Gmel.—F.]

[In the Royal Museum at Munich I have examined two specimens of a *Puffinus* from Madeira, brought home by H.G. the Duke of Leuchtenberg, which apparently belong to this species. They agree very well with the characters noticed above. The under tail-coverts are white, only the lateral ones at the base of the outer web dark, but this hidden.—F.]

PUFFINUS AUDUBONI, Finsch.

Puffinus obscurus, Audub. Syn. B. N. Am. 1839, p. 339; Baird, B. N. Am. p. 835; Coues, Proc. Acad. Phil. 1864, p. 137; Licht. Nomencl. p. 100.

Like *P. assimilis*, but the under tail-coverts fuliginous-black; the anterior lateral under tail-feathers are on the outer vane black, on the inner white; the white on the sides of the head extends, as in *P. assimilis*, not below the level of the eyes; bill deep leaden blue; feet and legs coloured as in *P. anglorum*.

This species inhabits the Atlantic Ocean, occurring not unfrequently along the shores of the Southern United States and in the Gulf of Mexico; it is abundant in the Bahamas and Bermuda.

I have examined a fine specimen in the Berlin Museum, collected by Mr. Deppe at Cape Florida (mentioned by Bonaparte as *P. floridanus*, Consp. ii. p. 204). "*P. l'herminieri*, Less.," cited by Bonaparte (Consp. pp. 189 and 204) as synonymous with this species, is not to be found in Lesson's 'Tr. d'Orn.'

We have before us a specimen of *Puffinus* from the Viti Islands, collected by Dr. Gräffe. It is the one mentioned by us as *P. nugax* (Centr. Polynesien, pp. 243 and 280, t. iii. f. 5), inserted only on the authority of Dr. Gräffe, who sent eggs from Viti Levu marked as those of this species. On comparing the specimen, the only one we have yet seen from this locality, we find it not to be the true *P. assimilis*, but a different species, which we are not able to make out. It resembles most *P. audubonii*, in having also the white not extended beneath the loreal region and eye, and the under tail-coverts fuliginous-black; but the specimen is smaller. Further researches must be made to settle this difficult species with certainty; we do not feel able to do so, having but a single specimen before us.

Long. tot.	Long. al.	Ap. al.	Caud.	Rostr. a fr.	Rostr. a rict.	Alt. rostr. a bas.	Tub. nas.	Tars.	Dig. med. (sine ung.).	
c. 11½–13″	7″ 2–7‴	2″ 1–3‴	1″ 2‴ 10–3‴	2‴ 11½–12½‴	15–16½‴	3¾–4‴	2–3‴	16–17‴	16–17‴	*dichrous* (Pelew, 11 spec.).
...	6 11	2 4	2 11	11	16	4	2	16	15	— (M'Kean Isl., type).
...	7 3	...	2 9	13½	18	4	...	20	20	— (*obscurus*, ap. Kuhl).
...	7 3	2 3	2 11	13	...	3½	2	17	16	— (—, Schleg., Bourbon).
...	7 0	2 3	2 10	12½	...	3	2	17	16	— (—, Atl. Oc.).
...	9 0	...	3·75	1·40″	24	...	...	1·80″	2·10″	*opisthomelas* (ex Coues).
...	8 7	...	3 4	16	20	...	...	19	19	— (*obscurus*, Vieill. ap. pl.).
...	...	...	...	14½	...	4	...	...	...	— (ex Elliot's fig.).
...	7 9	...	...	13	...	...	...	17	16	*audubonii* (Florida, Berl. Mus.).
...	8 0	...	4·25	1·25″	1·70″	...	...	1·60″	...	— (*obscurus*, Coues).
...	6 6–6 11	2 5–3 9	2 2–2 7	11 –12	...	...	...	16–17	15–17	*assimilis*, Gould (ex Schleg.).
...	6 3–6 6	...	...	11	...	...	...	15	...	Madeira.
...	7 9	...	3 2	14	...	...	...	17	...	*obscurus*, Gmel. (ex Gama Hartl.).
...	7 0	2 5	2 6	14	19½	3¼	1½	16	16	spec.?, Vitis.

46. STERNA LONGIPENNIS, Nordm.; F. & H. Orn. Centr. Polyn. p. 220 (syn. part.).

One specimen from the Pelews (*Capt. Heinsohn*), not in full plumage. Only the occiput and nape are black; forehead brownish, with darker shaft-stripes; the feathers of the grey upper parts with narrow pale edges; the three outer tail-feathers on the outer web grey, the remainder only washed with grey; the small wing-coverts along the humerus dark brown, forming a longitudinal band; bill black; feet reddish.

Long al.	rectr. ext.	rectr. interm.	culm.	altit. ad bas.	tars.	dig. med.
9″ 6‴	4″	2″ 8‴	14‴	3‴	9‴	8‴

The specific differences of *St. frontalis*, Gray, from New Zealand, which we formerly erroneously confounded with this species, have been pointed out already (Journ. f. Orn. 1870, p. 365).

The Pelew Islands are a new locality for *St. longipennis*.

47. Sterna melanauchen, Temm.; F. & H. Centr. Polyn. p. 224.

Two adult specimens, one from the Pelews (*Capt. Heinsohn*), the other from Uap (*Kubary*). Both localities are new for this species.

48. Sterna lunata, Peale; Hartl. P. Z. S. 1867, p. 331; H. & F. *ib.* 1868, pp. 9 & 118.

One specimen from Pelew (*Capt. Peters*).

49. Anous stolidus (L.); H. & F., P. Z. S. 1868, p. 9 (Pelew).

Seven specimens from the Pelews (*Capts. Heinsohn and Peters*). They agree exactly with specimens from N. America and Africa, but vary in the intensity of the dark colouring, and especially as regards the coloration of the head. In some the front and forehead are greyish white, changing into pale grey on the occiput and nape, and into pale ashy grey on the hind neck; in others the whole surface of the head is pale brownish grey. In one paler-coloured, apparently younger, specimen the head is uniform sooty brown like the neck, but mixed with single white feathers, which, above the black loreal regions, form an indistinct white supercilium. In all the specimens the lower half of the eye is margined narrowly with white; the legs and toes are blackish, the membranes lighter.

As regards the variation in size in this species, we must remark that the specimen from North America spoken of in Ornith. Centr. Polyn. p. 236, has not full-grown remiges, the first being just developing; from this cause the wing is much shorter.

We append the measurements of the Pelew specimens, to show the individual variation amongst specimens from the same locality.

Long. al.	rectr. longiss.	culm.	rictus.	altit. ad bas.	tars. long.	dig. med.	
10″ 5‴	6″ 0‴	17‴	24‴	4¼‴	10½‴	14‴	(Pelew Islands.)
10 9	5 3	16	23	5	10½	14	,,
10 9	5 2	17	24	4½	11	13½	,,
10 8	5 8	16	24½	4	11	14	,,
10 8	6 3	18	27	4½	11	14	,,
10 9	6 3	19	27	4½	11	14	,,
10 3	6 2	16½	..	4½	10½	14	,,

50. Anous tenuirostris (Temm.).

? *Sterna senex*, Cranch in Tuckey's Voy. Zaire (1818), App. p. 407.

Sterna tenuirostris, Temm. (nec Rüpp., nec Heugl.) Pl. Col. 202; (Temm.) Kittl. Kupfert. Heft iii. (1833), p. 28, f. 2, tab. 36. f. 1 (opt.).

Anous leucocapillus, Gould, P. Z. S. 1845, p. 103; Finsch & Hartl. Orn. Centr. Polyn. p. 237.

Sterna tenuirostris et *S. leucocapilla*, Schleg. Mus. P.-B. *Sternæ*, p. 37.

Eight specimens from the Pelew Islands (*Capts. Heinsohn and Peters*), where this species has not been hitherto noticed. This species differs from *A. stolidus* in its smaller size, the slender and nearly straight bill, the darker, more sooty-black coloration, and the purer, silvery-white surface of the head. In most of the specimens there is a dark greyish tinge on the temporal region, the hind neck and sides of neck. The younger bird is more of a sooty-brown coloration (as in *A. stolidus*), and has the upper wing-coverts partially margined with bright umber-brown. A still younger bird has the front and vertex already as pure white as the old one; and this is also seen in the nestling young, which is covered with black down. The legs are pale, as in *A. stolidus*, brownish or yellowish brown, in some yellowish. We see no reason for separating *A. leucocapillus*, Gould, from *A. tenuirostris*, Temm. The dimensions noticed by Prof. Schlegel are not sufficient to distinguish two species.

Long. al.	rectr. long.	culm.	rict.	altit. rostr.	tars.	dig. med.	
8″–8″ 9‴	4″–4″ 7‴	18–21‴	24–27‴	3¼–4‴	9–9½‴	11–12¼‴	(Pelew, 8 spec.)

Kittlitz gives a very accurate representation of this species (Kupfert. t. 36. f. 1), which he collected in the Carolines and also near St. Helena.

51. GYGIS ALBA (Sparrm.); Hartl. P. Z. S. 1867, p. 832; H. & F. *ibid.* 1868, pp. 9 & 118.

From the Pelews (*Capt. Peters*), and a beautiful pair (male and female) from Uap, where Mr. Kubary notices the species as rare.

In the Eastern Carolines, observed by v. Kittlitz on the island of Ualan (Denkwürdigk. i. p. 382).

52. PHAËTON CANDIDUS, Briss.

Phaëton flavirostris, Brandt.

Two adult specimens from the Pelew Islands (*Capt. Peters*). In one (collected by Capt. Heinsohn) all the white feathers above and below, including the two black-shafted middle tail-feathers, are strongly tinged with pale orange-rose (as in Reichenbach's fig. 852, tab. xxx.).

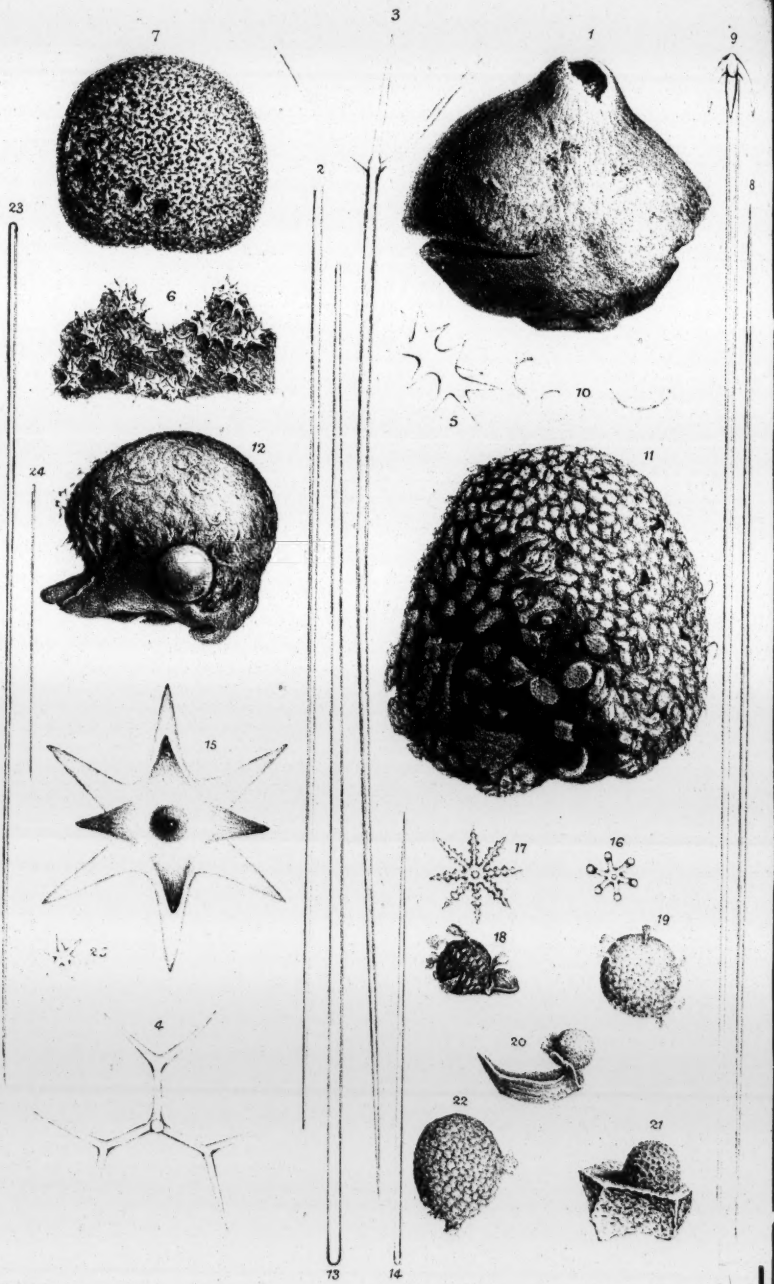
This species breeds on the Pelew group. In a former collection thence, forwarded by Mr. Godeffroy, we received the young in the first plumage.

The 'Novara' expedition procured a specimen (in October) on the Stewart group; and v. Kittlitz observed it in Ualan, Eastern Carolines (Denkwürdigk. einer Reise &c. i. p. 382).

53. CARBO MELANOLEUCUS, Gray; H. & F., P. Z. S. 1868, p. 9.

Two adult specimens from the Pelew Islands (*Capt. Peters*).

BRITISH
28 OCT 73
MUSEUM

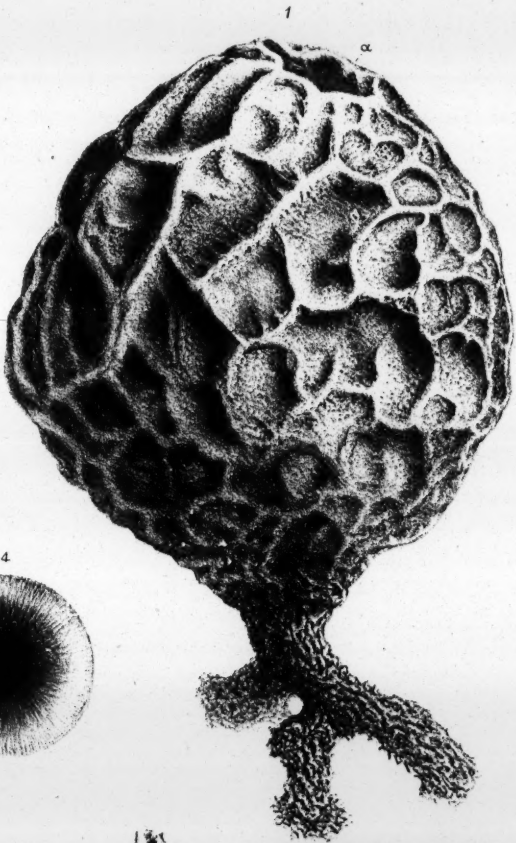


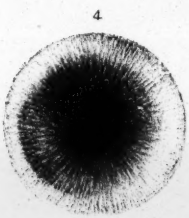
Del. et lith. W. L. Aldous

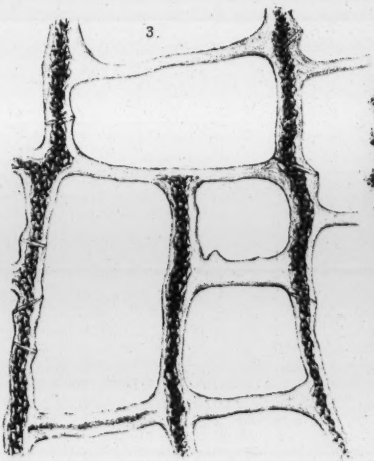
Tethea muricata 1–6. T. unca 7–10.
T. Ingalli. 11–17. T. norvagica 18–25.

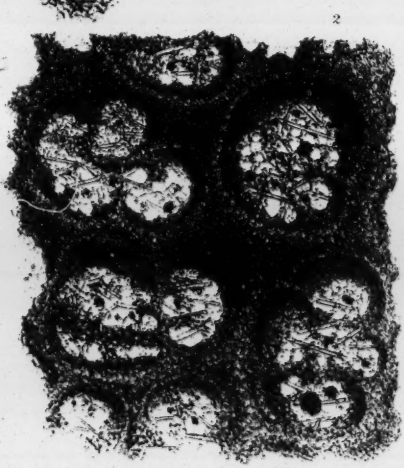
W. West & Co.

BRITISH
28 OCT 73
MUSEUM









Dal et lith. W. Lane Aldous W West & C° imp.

February 6, 1872.

R. Hudson, Esq., F.R.S., V.P., in the Chair.

The following papers were read:—

1. Contributions to a General History of the Spongiadæ. By J. S. Bowerbank, LL.D., F.R.S., &c.—Part I.

[Received January 15, 1872.]

(Plates V. & VI.)

Genus Tethea.

Tethea is eminently a natural genus; the generic characters are well maintained in all the species with which I am acquainted. There is always the same radiation of skeleton-fasciculi from the base or centre of the sponge; and this radiation is rarely in a straight direction, but almost always in lines more or less curved, giving a greater amount of resistance to any attempt to rend the substance of the animal asunder. Their defences against the attacks of smaller enemies are also beautifully apparent and exceedingly varied, so as to enable us to discriminate species with certainty by the combinations of the various forms of their spicula, which are evidently designed by nature to offer a passive resistance to every class of enemies to which they may be exposed. Thus the powerful primary defensive spicula of the surface, bristling at every part to meet the attacks of their larger assailants, render them any thing rather than an agreeable prey to any fish disposed to make a meal off them. When the larger external defensive spicula are not present, their places are usually supplied by an abundance of large and strong sphero-stellate spicula with sharp and powerful radii, as in *T. Ingalli* and in our British species *T. lyncurium*. The innumerable small but acutely pointed stellate spicula usually imbedded in the dermis and scattered over the surfaces of the interstitial membranes provide in an especial manner against the attacks, both externally and internally, of the small annulate and other creatures that would otherwise be prone to feast on their membranes and sarcode. The beauty and completeness of these conservative contrivances of nature for the preservation of these inert and humble creatures are wonderfully illustrative of the wisdom and beauty of creation.

Tethea muricata, Bowerbank.

Sponge spherical, subconical, sessile; surface even, minutely hispid. Oscula terminal. Pores congregated; porous areas exceedingly numerous. Dermis thin, abundantly furnished with stout elongo-attenuato-stellate spicula. Connecting spicula attenuato-expando-ternate-simple and bifurcated, very large and long, numerous; also recurvo-ternate, long and slender, and, rarely, spiculated

recurvo-ternate ones. Skeleton-spicula fusiformi-acerate, large and long, and the same form long and slender.

Colour in spirit dark dull green.
Hab. Hammerfest, 150 fathoms (*R. M'Andrew, Esq.*).
Examined in the wet state, in spirit.

I received this and two other species of *Tethea* from my friend Mr. M'Andrew in 1855 as a portion of the results of his dredging off the coast of Norway during that year. On examining and describing its structure I discovered in its dermal membrane the interesting and beautiful elongo-stellate form of spiculum which I subsequently figured in the first part of my paper "On the Anatomy and Physiology of the Spongiadæ" in the 'Philosophical Transactions of the Royal Society' for 1858, plate 25. fig. 18; and in the second part of the paper in the Phil. Trans. for 1862 I also figured a portion of the dermal membrane with the same forms of spicula *in situ* in plate 31. figs. 14 and 15, designating the sponge from which the figures were derived *Tethea muricata*.

The condition of this specimen is remarkable. It has two deeply incised wounds in a horizontal direction, the interior surfaces of which are healed and covered by a new portion of dermal membrane. The fractures are on two sides of the mass and are opposite to each other, as if an attempt had been made by a fish to tear it from the base on which it was seated, but, not liking the mouthful of sharp spicula, had abandoned the attempt. There are also two uninjured parts of the sponge-surface opposite to each other; the largest of the two is represented in Plate V., the smaller one on the other side does not exceed four lines in length.

The hispidation of the surface of the sponge is not apparent to the eye, but it is readily sensible to the touch of the finger. It is produced by the expanding radii of the large bifurcating ternate heads of the connecting spicula. These organs, which perform the double office of connecting and external defensive spicula, are, comparatively speaking, exceedingly large: they are from $\frac{1}{6}$ to $\frac{1}{5}$ inch in length, with a diameter near the head of $\frac{1}{250}$ inch; and the expansion of the ternate heads frequently exceeds $\frac{1}{12}$ part of an inch. These measurements apply to fully developed spicula; they vary to a great extent in size; and the mode and extent of the production of the ternate heads are also exceedingly variable.

There is one large terminal osculum, which appears to be permanently open, and beneath which all the excurrent canals are concentrated. The dermal membrane and the porous system are exceedingly interesting and beautiful. A small piece of the dermis is represented by fig. 6, Plate V. The areas of the dermal network are not open; they are each furnished with a very transparent membrane, upon which a few spicula may occasionally be seen. I could not detect any open pores. The elongo-stellate spicula are exceedingly numerous on the dermal membrane: there are also a few of them scattered on the interstitial membranes near the surface of the sponge; but they are of very rare occurrence on the deeper-seated portions of those

organs. The skeleton-fasciculi contain comparatively few spicula. They vary considerably in size; a portion of them are very large and long, frequently exceeding $\frac{1}{5}$ inch in length with a diameter of $\frac{1}{250}$ inch. The smallness of their number is compensated by the intermixture in their fasciculi of the stout long shafts of the ternate connecting spicula; and the interstices of these larger organs are frequently filled in with smaller and more attenuated skeleton-spicula, rendering the whole skeleton firm and compact.

The recurvo-ternate spicula are comparatively few in number; their apices rarely reach quite to the dermis; and, as in other genera in which they occur, their office appears to be to act as defences in the intermarginal cavities. The slender spiculated recurvo-ternate ones are of rare occurrence.

The basal portion of the sponge is furnished with a few soft flexible radical processes, about $\frac{3}{4}$ inch in length. They are apparently prolongations of the skeleton-fasciculi of the sponge, and are composed of the same description of spicula, but very slender in their proportions; among them there were a few small recurvo-ternate spicula, and their ternate heads were frequently in opposite directions. Apparently these spicula are thus present in accordance with the laws of production existing in the animal, and not to assist in any manner in the attachment of the sponge to the spot on which it is based. There were also a few very immature expando-ternate bifurcating spicula, apparently quite as much out of place as the recurvo-ternate ones. The same description of appendages, but stouter and stronger, are found at the base of *Tethea lyncurium* when the necessities of the animal require their presence.

Mr. W. Saville Kent has described a mutilated specimen of this species in the 'Monthly Microscopical Journal' for 1870, p. 203, under the designation of *Dorvillia agariciformis*. The upper portion of the sponge has evidently been torn away from its basal one, causing the part described to assume a form very much like that of an Agaric; and the under surface of the specimen, having secreted a new dermal membrane, has contributed greatly to the deception that it was a natural form of the animal. The perfect secretion of a new dermal membrane to cover the torn surface is a natural operation that in other sponges frequently takes place within twenty-four hours of the infliction of such a wound; and the new membrane in due course would secrete the stellate spicula which are natural to that organ. The filiform appendages at the base of the specimen figured by Mr. Kent have very much the appearance of being some of the skeleton-fasciculi of the sponge drawn out of the basal portion at the time of its mutilation.

In treating of the spicula, the author has fallen into the error of describing some of those organs that do not belong to the species under consideration. In the plate accompanying his paper the figures 1 to 9 and fig. 13 certainly belong to his *Dorvillia agariciformis*, fig. 13 being a tortuous specimen of a skeleton-spiculum, the normal form of which is straight or very slightly curved. The figures 10, 11, 12, 14, 16, 17, 18, and 19 are certainly extraneous

spicula, several of them apparently belonging to silicco-fibrous sponges. The occurrence of extraneous spicula on such sponges is by no means an uncommon occurrence. On the piece of the dermis of my specimen I mounted for figuring in 1855 I found several extraneous spicula, of forms different from those figured by Mr. Kent, and one of the form represented in his plate by fig. 18.

It is a good rule never to regard any spicula that may be obtained by the dissolution of a piece of the sponge in nitric acid and mounting in Canada balsam as belonging to the species, unless they can be detected *in situ* in a thin slice of the sponge made at right angles to its surface and mounted in the same material. There are very few mountings of sponge-spicula from almost any species of recent sponge in which spicula not belonging to it may not be detected; and these are derived not only from the surface of the animal, but occasionally also from its interior, in which they have been imbedded in an early stage of its development; and in some genera naturally given to the appropriation of extraneous materials they are frequently very numerous.

TETHEA UNCA, Bowerbank.

Sponge spherical, sessile. Surface smooth and even, minutely dotted. Oscula and pores inconspicuous. Dermis thin, pellucid, furnished abundantly with very minute, simple, and contorted bihamate spicula, variable in size and form. Skeleton—spicula fusiformi-acerate, large, and long, and with attenuato-recurvo-ternate connecting and defensive spicula long and slender, and rarely with porrecto-ternate ones, very small and slender. Interstitial membranes—tension-spicula acerate, very slender, and often flexuous; retentive spicula the same as those of the dermis, very numerous.

Colour dull dark green.

Hab. Hammerfest, 150 fathoms (*Mr. M'Andrew*, 1855).

Examined in the condition it came from the sea.

This sponge (the only specimen of the species with which I am acquainted) was dredged at Hammerfest by Mr. M'Andrew during his excursion to the North Sea in 1855, and kindly presented to me, with many other interesting specimens, on his return to England.

The texture of the sponge is very much softer and compressible than that of any other species of the genus with which I am acquainted, and its structure much more simple than is usual in other nearly allied species. The surface of the sponge is even, but is very minutely dotted all over by the slight projection of the extreme distal points of the skeleton-fasciculi beneath the dermal membrane; and in the midst of these fasciculi we frequently find one or two of the recurvo-ternate spicula projecting slightly beyond the others; but comparatively they are rather few in number. The dermal membrane is profusely furnished with the minute, simple, and contort bihamate retentive spicula, which are distributed rather evenly over the whole of its inner surface. These spicula are remarkable for their minute size; the contort ones appear usually to be the largest;

one of the best-developed ones *in situ* measured $\frac{1}{1500}$ inch in length, while a simple bihamate one of an average size measured $\frac{1}{3000}$ inch in length. The skeleton-spicula are large and strong, and frequently exceed $\frac{1}{8}$ inch in length; the shafts of the recurvo-ternate ones are quite as long as those of the skeleton-spicula, but very much less in their diameter. A very few porrecto-ternate spicula were detected; and these were very small, and were imbedded irregularly among the interstitial membranes. The interstitial membranes are abundantly supplied with the same forms of retentive spicula that abound in the dermal membranes, and they have also a considerable number of very slender flexuous tension-spicula.

The most distinctive specific character in this sponge is undoubtedly the minute bihamate spicula so abundant in the dermal and interstitial membranes; but it must be remembered that they require a power of six or seven hundred linear to render them distinct to the eye *in situ* when mounted in Canada balsam, and that when viewed in water they are totally obscured by the sarcode in which they are imbedded.

TETHEA INGALLI, Bowerbank.

Sponge sessile, spherical or oval. Surface variable, from smooth to strongly papillated; papillæ either acutely terminated or abruptly truncated. Oscula and pores inconspicuous. Dermal rind thick, furnished with innumerable, closely packed, large, subsphero-stellate spicula; radii acutely conical. Dermal membrane crowded with minute clavate subsphero-stellate spicula. Skeleton—radial fasciculi large and numerous, polyspiculous, emanating from a spherical polyspiculous centre; spicula fusiformi acuate, large, and long; apices frequently bluntly terminated. Interstitial membranes—tension-spicula of the same form as the skeleton ones, but smaller and slender; retentive spicula attenuato-stellate; radii minutely and entirely spinous, numerous. Gemmulation external.

Colour in spirit deep orange or dull red.

Hab. Fremantle, Australia (*Mr. George Clifton*).

Examined in the wet condition from spirit and from saturated salt water, 1855.

I am indebted to my late friend Mr. Thomas Ingall for my first acquaintance with this very interesting species. He presented to me a small dried specimen less than an inch in diameter, labelled "locality unknown." On examining and describing the sponge I obtained from it the type forms of the spicula represented in plate 25. figs. 12 and 14, 'Philosophical Transactions,' 1858.

I subsequently received from my friend Mr. George Clifton, of Fremantle, Australia, a jar full of these sponges preserved in spirit; the whole of them were in very fine condition. They varied in size from one about 9 lines in diameter to that represented in Plate V. fig. 11.

The normal form appears to be globular, but subject to very considerable variations. Among the eighteen specimens in my possession, some are nearly spherical, while others are much taller than

they are broad; and in one large specimen its breadth is nearly double its height. The surface-characters are also variable; sometimes, especially in young specimens, they are quite smooth, at others strongly, but irregularly papillated. The apices of the papillæ in some are round or flat, and in others they terminate in acute thread-like points. In fact neither the form nor the surface of the sponge affords any reliable specific characters. Some of the specimens attached firmly to fragments of shells were destitute of root-like appendages, and their bases were rounded off like the other parts of the sponge; others exhibited a broad base with one or two smooth impressions, threw out round their margins short hook-like fleshy claspers with expanded terminations, by which they secured a firm seat on the smooth bodies to which they fixed themselves. In one case the attachment thrown out was a fleshy cylinder an inch in length and 2 lines in diameter, with a flat termination nearly 4 lines in breadth.

These modes of locating themselves are not peculiar to this species, but may be observed in many others of the same genus in cases where they are needed.

When a section of a mature sponge is made, there is the appearance of a thick dermal rind, frequently 3 lines in thickness; it is composed of innumerable, closely packed, large, subsphero-attenuato-stellate spicula, the radii being acutely conical; and this form, in diminished quantities, is found in the interstitial membranes in all parts of the sponge.

The dermal membrane is thin; it is profusely furnished with minute clavate subsphero-stellate spicula, which are so numerous and so closely packed as completely to obscure their forms, *in situ*, excepting at the extreme edges of the piece of membrane under examination. No other forms of spicula could be detected in the membrane.

The skeleton-fasciculi radiate in compact curved lines from a central solid spherical mass nearly $\frac{1}{4}$ inch in diameter. It is composed of condensed sarcode in which is imbedded a large quantity of acuate spicula, smaller than those of the skeleton, but of the same form; they are disposed without any approach to regularity; and from the surface of this mass the skeleton-fasciculi radiate in every direction. The hemispherical bases of their spicula all either penetrate its surface for a short distance, or they are in close conjunction with it. The spicula of the skeleton-fasciculi are exceedingly numerous at their commencement at the basal centre of the sponge.

The interstitial membranes are also abundantly supplied with spicula; the tension ones are rather few in number, but the retentive ones are very numerous. The retentive spicula of the interstitial membranes of most sponges are of the same form and size as those of the dermal membrane; but this is not the case in the sponge in course of description, in which they vary distinctly from the dermal ones, a very few of which may be occasionally detected dispersed on the membranes at no great distance from the dermal rind. In the deeply seated membranes they all appear to be attenuato-stellate

with their radii minutely and entirely spinous; they appear to be evenly dispersed on all parts of the deeply seated membranes. The strongly marked character of these spicula, combined with those of the dermal membrane, renders the retentive spicula of this sponge the most descriminative of all its specific characters.

I found but one instance of external gemmulation, that represented by fig. 12 (Plate V.) illustrating this paper.

TETHEA NORVAGICA, Bowerbank.

Sponge spherical, sessile. Surface papulous, even. Oscula and pores inconspicuous. Dermis thin and pellucid, furnished abundantly with minute subsphero-stellate spicula; radii conical, acute. Skeleton—radii abundantly spiculous, compact in the interior, radiating at their distal extremities; spicula fusiformi-acuate. Interstitial membranes—tension-spicula fusiformi-acuate, long and slender, very few in number; retentive spicula minute, subsphero-stellate, very abundant, and a very few large spicula of the same form near the dermal surface.

Colour light green, preserved in saturated salt and water.

Hab. From Drontheim to North Cape, from 20 to 200 fathoms (*Mr. M'Andrew*, 1855).

Examined in the condition in which it came from the sea.

I am indebted to the kindness and liberality of my friend Robert M'Andrew, Esq., for thirty-seven specimens of this interesting sponge. They range in size from 2 to 7 lines in diameter. Their substance is very firm, and they vary little from the regular spherical form. The general aspect of the surface is even to the sight and touch; but it is in truth formed of numerous flat-topped papillæ, each deriving its form from the radiation of the distal end of one of the stout skeleton-fasciculi, the terminal spicula of which are corymbose; and the whole of the terminations appear amenable to the same law. The inhalant pores are situated in deep depressions between the terminal papillæ; and immediately beneath them there are large and often tortuous intermarginal cavities. The dermal membrane is profusely furnished with the minute subsphero-stellate spicula; and this abundance of the spicula also obtains in the lining membranes of the intermarginal cavities; but beyond these parts the minute stellate spicula are distributed much more sparsely. Within this region of abundance there is also a dense accumulation of the sarcode, firmly cementing the distal terminations of the skeleton-fasciculi together, so as to form a stout dermal rind of comparatively considerable thickness. Within this thickened portion of the surface of the sponge a very few subsphero-stellate spicula of large size were found; but none of them could be detected among the deeply seated interstitial membranes. I could not detect the oscula in any of the specimens in my possession.

The skeleton-fasciculi radiate from the centre of the sponge; and the spicula composing them have all their hemispherical bases directed to that point. They are closely and firmly cemented toge-

ther, and remain so until they reach the point of their natural divergence immediately beneath the dermal surface, at which point they are usually closely broken off.

One of the most interesting subjects in the history of this little species is the mode of its propagation, which appears regularly to be by an abundant production of external gemmules.

Of the thirty-six specimens in my possession, twenty-two have more or less of gemmules attached to their surfaces. The largest number on any one sponge is eleven, on the little specimen represented by fig. 18, Plate V.

They are projected from all parts of the surface. The length of their fleshy thread-like attachments to the parent sponge varied considerably; and in one gemmule very perfectly developed, with a diameter of $1\frac{1}{2}$ line, the attaching filament was $\frac{1}{2}$ inch in length and very slender. On many of the mature specimens of sponges on which there were no gemmules remaining, there were short fleshy filaments which had every appearance of being the remains of the attachments of these little bodies which had separated from the parent sponge.

The attachments of the mature specimens are various, in accordonce with their necessities. Sometimes it is effected on smooth surfaces by a close adherence of the basal portion of the sponge, while in other cases they project short root-like appendages varying from one to four or five in number, the distal extremities of which frequently expand to a considerable extent over the rough surfaces of dead shells or other substances on which they have located themselves; and in one case of a *Tethea* thus located on a dead shell and having gemmules produced near its base, these little bodies, still attached to the parent sponge, had themselves projected small cords of attachment from the parts of their surfaces nearest the shell surface with the evident intention of securing a permanent attachment previously to separation from the parent.

The tension spicula of the interstitial membranes are very long and slender; they are mostly dispersed in lines more or less according with those of the skeleton-fasciculi.

Genus Halispongia, Bowerbank.

De Blainville, in his 'Manuel d'Actinologie,' p. 532, proposed the name of *Halispongia* to receive all those sponges that Fleming and Grant had designated *Halichondria*. But as our recent and more extensive knowledge of British and exotic species comprised under the names of *Halichondria* and *Halispongia* has demonstrated their widely different skeleton-structures, it has become necessary to divide this very extensive group into a series of new genera in accordance with their organic structural affinities. I therefore proposed, in vol. i. p. 207 of 'Monograph of the British Spongiadæ,' to limit the genus *Halispongia* to such sponges among the kerato-fibrous suborder as agree with the following character:—

Skeleton kerato-fibrous. Fibres solid; primary fibres compressed,

containing an irregularly disposed series of spicula; secondary series of fibres unsymmetrical, cylindrical, without spicula.

With further experience of the sponges coming under this designation, I have in many cases found that the primary fibres frequently contained a mixture of spicula and sand, and that the latter often predominated in quantity as in the skeleton-fibre of the sponge in course of description. Hereafter perhaps, from the regularity of the fibrous skeleton structure and the prevalence of sand in its primary fibres, it may be advisable to refer it to a new genus; but for the present I have thought it as well to retain it in the genus *Halispongia*.

HALISPONGIA CHOANOIDES, Bowerbank.

Sponge massive, subspherical, pedicellate; pedicle short and stout, branching into radical processes. Surface irregularly and coarsely reticulated; rete forming large elevated ridges; areas deeply depressed and minutely reticulated. Oscula within a large cylindriform cloaca, extending from near the base to the apex of the sponge, terminating in a wide permanent simple orifice. Pores inconspicuous, congregated in irregular areas. Dermis coriaceous, stout; surface abundantly furnished with minute granules of sand; dermal membrane thin, pellucid. Skeleton symmetrical; rete stout; primary lines with axes of sand, spicula, and other extraneous matters; secondary lines without extraneous matters; areas square or oblong. Sarcode abundant, firm, and fleshy. Gemmules large, lenticular; nucleus radiated.

Colour in spirit dull purple.

Hab. Fremantle, Australia (*George Clifton, Esq.*).

Examined from spirit in the state in which it came from the sea.

I am indebted to my indefatigable and liberal friend Mr. George Clifton for this very remarkable specimen, which he sent in spirit from Fremantle. The skeletons of what are apparently various species of this genus are very common in collections of sponges from Australia; but the one in course of description is the only specimen I have seen in a state of perfect preservation as it exists during life. The form of the present specimen, closely approaching spherical, will probably be found hereafter to be subject to considerable variation, as this is the case with many of the closely allied specimens in the skeleton state, some being elongately oval and some inversely conical. The skeleton is formed of an open network of large and strong keratose fibres that are quite visible to the unassisted eye when separated from the abundant sarcode in which they are imbedded. The material imbedded in the primary fibres is very various, principally grains of sand, but frequently also fragments of spicula disposed at various angles to the axial line of the fibre. At first sight it would almost seem as if a discretion were exerted in the choice of the grains of extraneous matter imbedded; they are selected of such uniform size, and are disposed in the fibre with so much regularity. This is effected in the same manner as that de-

scribed in the account I have given of the construction of the sandy fibres of *Dysidea fragilis* in my paper "On the Anatomy and Physiology of the Spongiadæ" in the 'Philosophical Transactions of the Royal Society' for 1862 (pl. xxviii. figs. 3, 4, 5, p. 757). The mode of aggregation in the present case is well demonstrated in some of the young primary fibres of the sponge. A finely pointed purely keratose fibre is projected forwards, the termination of which is adhesive, and to which any small body touching it becomes cemented and is then speedily covered by a thin coat of keratode, the surface of which is not adhesive. The adhesive point continues its forward course continually, thus adding material to the arenaceous axis; while the successive developments of concentric keratose layers, destitute of adhesive power, surround and maintain the arenaceous axis in its proper position. The apparent discretion in sizing the selection of granular matter may thus be naturally accounted for; and it may be readily imagined that the slender adhesive advancing point of the fibre would not support and retain any larger material than that which we find it to have appropriated. The secondary fibres pullulating from the sides of the mature non-viscid primary ones are not adhesive, and are therefore free from arenaceous axes.

The dermis is very thick; and its strength is further increased by a very abundant imbedment in its substance of particles of sand and other small extraneous matters. This appears to be accomplished with great regularity, especially on its external surface, where all the prominent ridges of the great reticulations are as closely and regularly set with granules as if they had been the work of a lapidary. The internal surface of the coriaceous dermis exhibits the same structural peculiarities as the external one.

The porous areas are not simple, as we find such organs in other cases of their occurrence, where we have a thin pellucid membrane with a group of three or four pores. In the present case the porous area is large, thin, and transparent, and is more or less reticulated by fine thread-like lines of extraneous matter; and within each of the little areas thus formed there is a single pore. It is a remarkable circumstance that the boundaries of these minor areas are frequently determined by triradiate spicula of calcareous sponges imbedded in the surface of the membrane, the radii of the spicula forming more or less of the boundaries of three such areas. The great porous areas are frequently oval and of considerable size, containing as many as seven or eight of the small single pore-areas.

The sarcode in this sponge is remarkable for its substance and opacity; the nearest familiar representative of it is the boiled albumen of an egg. When a thin portion of it is mounted in Canada balsam and thus rendered transparent, a considerable number of comparatively large lentiform gemmules are to be seen imbedded in the interstitial membranes. They contain a more or less well-defined central nucleus with innumerable minute radial lines which reach to the extreme margin of the gemmule. They are certainly not spicula, but have every appearance of being minute tubuli.

This sponge is remarkable for being the living type of a well-known flint fossil from the chalk, named, figured, and described by Dr. Mantell, in his 'Fossils of the South Downs, or Geology of Sussex,' p. 179, pl. 16. figs. 19, 20, and 21, as *Choanites Kœnigii*. The author appears to have read off from his fossil specimens very correctly the former history of the structural characters of the sponge; and he has described its radical processes as they appear in numerous specimens of the fossils as well as in the recent sponge. The following is the specific character he assigns to the fossil.

"Inversely conical, externally marked with irregular fibres, some of which penetrate the substance and terminate in openings on the inner surface; central cavity cylindrical, deep, narrow; base fixed by radical processes."

With very slight alteration this description of the fossil would answer as nearly as possible for a specific description of the recent specimen.

I have several fine specimens of this fossil—one, a natural longitudinal section through the middle of the sponge, exhibiting the surface of the great cloacal cavity and the numerous fossilized canals radiating from it. Their entrances into the cloaca are covered by a thin layer of silex. In another specimen, which has no extraneous flint around it, the fibrous structure is indistinctly visible on the exterior of the mass; but on making a longitudinal section of it the fibres all round the distal end of the cloaca became beautifully visible, every fibre being covered by a thin layer of silex, while the interspaces were entirely free from that material. In a third specimen, two of these sponges have coalesced and become as one, following exactly the law that always obtains with recent sponges under such circumstances. On some parts of the external surface there appear doubtful traces of the remains of the dermal integument; and over all the other parts the interlacing skeleton-fibres slightly coated with silex are visible by the aid of an inch lens. I have never seen a specimen of this fossil which exhibited the fossilized dermal integument, excepting in a thin transverse section of one from apparently about the middle. It is a very regular oval of 3 inches by $2\frac{1}{4}$ inches; and in this the dermal integument is indisputably present. Unfortunately I could obtain no more of this beautifully illustrative specimen than the slice in my possession.

I have entered thus minutely into the comparison of the fossil with the recent sponge, as it appears to afford strong additional evidence of the great antiquity of the land- and water-productions of the southern portions of our globe still above the sea-level; and it appears, from the similarity of the recent productions of that portion of our earth, that they are very closely allied to the fossil productions of the chalk period of our part of the world. The same course of reasoning may be applied to the London-Clay period; among the fruits and seeds of that formation their nearest allies were almost invariably to be found among the fruits and seeds of our Australian colonies.

HYMENIACIDON PULVINATUS, Bowerbank.

Sponge sessile, massive. Surface smooth, tuberculated. Oscula simple, numerous, dispersed, small. Pores inconspicuous. Dermal membrane thin, abundantly spiculous; spicula closely and irregularly felted together, fusiformi-spinulate, as large as those of the skeleton. Skeleton arranged in large, thick, sinuous, irregularly formed plates of skeleton-tissue, running in various angles towards the dermal surface, separated from each other by very large interstitial cavities disposed in the same direction as the skeleton-plates; spicula fusiformi-spinulate or subclavate.

Colour in the dried state ochreous yellow.

Hab. Calibert Quay, twenty miles due east of Belize, in 8 feet water (*Mr. Dyson*).

Examined in the dried state.

This sponge is, I believe, the largest recent species known to naturalists. Two specimens of it were found by Mr. Dyson at Calibert Quay, in the neighbourhood of which he was collecting specimens of natural history. He told me that the summit of the largest specimen was just below the surface of the water, and that he passed one of the oars down by the side of the sponge and found that it was 8 feet in height, and that they chiselled off the top of the sponge with the oars and cut it into three pieces for the convenience of packing it. What the diameter of this enormous mass was in the living state he did not tell me; but in its present dried condition its greatest diameter is 34 inches, and its lesser one 29 inches. The second specimen, which appears to have been very little inferior in size, has a diameter of 27 by 21 inches. The surface is smooth but abundantly tuberculated; the tubercles are small and depressed, rarely exceeding an inch in diameter, and are less than an inch in height. The oscula are numerous and small, rarely exceeding 2 lines in diameter; they are simple orifices of a circular or oval form. The dermal membrane is crowded with spicula so thickly felted together that their forms can scarcely be determined even when mounted in Canada balsam, excepting at the thin edge of the specimen; if there be any difference between them and those of the skeleton, it is that they are rather less in size.

The interior mass of the sponge is formed of thick, sinuous, irregularly shaped plates of skeleton-structure, all more or less disposed in the direction of the external surface, where they expand beneath the dermal membrane; and over these expansions the pores are situated. The plates of skeleton-tissue are separated from each other by very large interstitial spaces, each one being lined by an interstitial membrane. These large spaces accompany the skeleton-plates in their progress to the dermal surface; and immediately above their terminations the oscula are found, varying in number from one to two or three.

The structures of the skeleton-tissues are quite in accordance with those of numerous other species of *Hymeniacidon*; for it must be remembered that, however large or small a sponge may be, the ana-

tomical proportions of its essential organs never vary. The fusiformi-spinulate skeleton-spicula vary somewhat in size; and while some of the spinulate bases are globular, others are more or less clavate. An average-sized spiculum measured $\frac{1}{60}$ inch in length, and greatest diameter $\frac{1}{2\,1\,4\,3}$ inch.

The history of this sponge has more than usual interest, as it tends to reconcile and explain difficulties in our knowledge of the ancient sponges, many of which in the lower beds of the Portland Oolite have evidently been of enormous size. Among the débris of the cliffs of Portland not very far on the shore, beyond the little village of Fortune's Well at the head of the great Chesil bank, I recollect seeing one mass more than a yard square that had evidently been one large sponge, with numerous anastomosing branches, each 4 or 5 inches in diameter, of silicified matter, with the large interstices between the ramifications filled up with pure Portland Oolite. And during the excavation of the great dry cutting that encloses and protects the fortifications I observed that they had cut through numerous masses of flint, many of which were from 7 to 10 feet in length and 2 or $2\frac{1}{2}$ feet thick at the middle, gradually thinning away towards their margins. I examined fragments of many of these, and found them quite as full of the remains of sponge-tissues, Polythalamia, fragments of minute corals, and other extraneous matters as the smaller flints of the same oolitic beds, the greensand, and the chalk flints. From the great size of *Hymeniacidon pulvinatus* among living sponges, we may well imagine that the fossil siliceous masses in the lower beds of the Portland Oolite may have been in their day what *Hymeniacidon pulvinatus* at Calibert Quay, near Honduras, now is in these seas.

It has been said by eminent naturalists that there appears to be no known limit to the increase in size of the large crocodilian reptiles; and the same may well be said of many of the sponges. Their organic structures (young or old, large or small) never vary to any appreciable extent in size or form; and the vast difference in those respects that frequently exists in two individuals of the same species is due only to a multiplication of their internal organs. I have other specimens of *H. pulvinatus* in my possession—one 12 or 14 inches in diameter, 8 or 9 inches in height, and a smaller one, not exceeding 6 inches in diameter by about 4 inches in height. All of the specimens are of the same massive cushion-like form.

DESCRIPTION OF THE PLATES.

Plate V.

Tethea muricata, Bowerbank.

Fig. 1 represents the type specimen of the species, of the natural size, from Hammerfest.

Fig. 2. Half of one of the large fusiformi-acerate skeleton-spicula, magnified 36 linear.

Fig. 3. One of the simple attenuato-expando-ternate connecting and defensive spicula, magnified 36 linear.

Fig. 4. Distal termination of one of the attenuato-expando-ternate bifurcating connecting and defensive spicula, magnified 36 linear. This figure represents one of the most regularly developed heads of this form of spiculum, and by no means one of the largest of them. They vary in the mode and extent of the development of their radii to a very great extent.

Fig. 5 represents one of the stout elongo-stellate defensive spicula of the dermal membrane, magnified 308 linear.

Fig. 6. A small piece of the dermal membrane with the elongo-stellate spicula *in situ*, magnified 183 linear. The recurvo-ternate spicula of *Tethea muricata* are accurately represented by fig. 9, although the spiculum figured does not belong to that species, but to *T. unca*.

Tethea unca, Bowerbank.

Fig. 7 represents the type specimen, of the natural size.

Fig. 8. One of the fusiformi-acerate skeleton-spicula, magnified 36 linear.

Fig. 9. A recurvo-ternate connecting and defensive spiculum, magnified 123 linear.

Fig. 10. A group of three of the minute bihamate spicula from the dermal membrane, magnified 530 linear.

Tethea ingalli, Bowerbank.

Fig. 11 represents one of the largest and best-developed specimens, from Fremantle, Australia. Natural size.

Fig. 12. A younger specimen of the same species, from Fremantle, Australia, with a gemmule attached to it. This sponge is smooth over nearly the whole of the surface; and it has an expanded concave base, having been apparently attached to a smooth convex surface. Natural size.

Fig. 13. One of the large fusiformi-acuate skeleton-spicula bluntly terminated, magnified 80 linear.

Fig. 14. A small fusiformi-acuate spiculum from the central mass of the sponge, whence the skeleton-fasciculi emanate, magnified 80 linear.

Fig. 15 represents one of the large subsphero-stellate spicula from the rind of the sponge, magnified 530 linear.

Fig. 16. One of the minute clavate subsphero-stellate spicula from the dermal membrane, magnified 530 linear. This figure represents a very perfectly formed one; they vary considerably in shape and in the elavation of their radii.

Fig. 17. An attenuato-stellate spiculum with the radii entirely and strongly spined, magnified 530 linear. These spicula vary in the number of their radii and in the degree of spination to a very considerable extent.

Tethea norvagica, Bowerbank.

Fig. 18. A small specimen of the species based on a fragment of shell, with eleven gemmules in various stages of development attached to its surface, natural size.

Fig. 19. A well-developed specimen with six gemmules attached to it, natural size. There is no apparent attachment to this sponge.

Fig. 20. One of the smallest specimens in my possession, attached to the remains of the shell of a small *Balanus*, natural size.

Fig. 21. A small well-developed specimen broadly based on the surface of a small stone, natural size. This sponge has thrown out broad, thin, adherent plates on the surface of the stone, but they are not visible without the aid of a 2-inch lens.

Fig. 22 represents the largest specimen of the species in my possession, natural size. The small mass at the base is the remains of a shell to which it has apparently been attached; the mass on the right-hand side of the figure consists of two gemmules closely pressed together.

Fig. 23. One of the skeleton-spicula, magnified 80 linear.

Fig. 24. One of the tension-spicula of the interstitial membrane, magnified 80 linear.

Fig. 25 represents one of the minute subsphero-stellate spicula of the dermal membrane, 530 linear.

PLATE VI.

Fig. 1. *Halispongia choanoides*, Bowerbank. From Fremantle, Australia. Natural size. (*a*) the terminal orifice of the great cloacal cavity.

Fig. 2. A portion of the dermis mounted in Canada balsam, exhibiting the inhalant areas and their pores in an open condition, magnified 36 linear.

Fig. 3. A small portion of the skeleton-structure, showing the primary fibres containing their characteristic axial line of sand and other extraneous matters, while the secondary ones are free from such materials, magnified 14 linear.

Fig. 4. A representation of a well-developed gemmule as it appears in Canada balsam, attached to the surface of the sarcodous membranes, magnified 80 linear.

2. Notes on *Rhinoceros sumatrensis*, Cuvier.

By JOHN ANDERSON, M.D., Calcutta.

[Received January 13, 1872.]

Having had an opportunity of examining a living specimen of this species, I have drawn up the following remarks, which may prove of sufficient interest to merit a place in the Society's 'Proceedings.'

The specimen examined is a young female that strayed into Chittagong in February 1869, when it was captured, and where it has remained till within the last few weeks. It has been brought to Calcutta by Mr. Jamrach of London, to whom I am indebted for my examination of this interesting animal. Mr. Jamrach has purchased it in the hope of being able to take it to London alive, where, if he succeeds in his endeavour, it will doubtless attract much interest, as no living example of this species, that I am aware of, has hitherto reached England. The uncertainty, however, of this enterprise induces me to forward to the Society these notes, together with an unquestionable representation of the external characters of this species.

There is no previous record of this Rhinoceros having been found so far west* as Chittagong, about 92° E. long.; but I see nothing remarkable in this, as the fauna of Eastern Bengal is pronouncedly Malayan. It is also probable, as Blyth observes, that it ranges into Assam, because, while at Bhamô in Upper Burmah, I was informed by an intelligent native that two-horned Rhinocerotes are found in the Mogonny district, which is close to the confines of Assam, and as far north as the twenty-sixth degree of north latitude. This same informant also assured me that he had seen at Mogonny a Rhinoceros-head with three horns.

The female which forms the subject of these observations is about

* In the 'Mammals of India' it is stated to have been shot at as high a latitude as 23° N., near Sandoway, which, however, lies only between the 18th and 19th parallels N.

4 feet 6 inches high at the shoulders, and about 8 feet from the snout to the root of the tail; it weighs nearly 2000 lbs.

The deep and rather short trunk is set on low stout limbs. The head is not much tapered; the anterior horn, low and rounded, is placed above the nostril; the posterior horn is conical and situated above the eye; the two are separated by a considerable interval. The ears are full and more rounded than pointed, and fringed with long, rather drooping hairs. The eye is small. The upper lip is anteriorly pointed and prehensile. The tail has numerous transverse folds, and reaches nearly to a line with the groin, having long hair on the anterior and posterior borders of its lower third. The skin is ashy grey, and covered with bristles about one inch in length, and its tubercles are small and flat. A pendulous fold on the side of the neck, with the skin behind it thrown into small loose folds; a fold behind the shoulder, across the back from side to side, with a fold at its lower extremity across the fore leg; a lumbar fold from the groin, but not reaching to the back; two short folds behind the haunches, with another fold below them, across the leg.

The hindmost horn is the smallest and about two inches in height; it has a quadrangular base, with two of the angles external (one posterior and the other anterior), and its apex is conical. It is placed between the eyes, but its posterior basal angle is slightly behind the external margin of the eye, while the anterior angle is about three inches before the inner margin of the eye. The anterior horn, separated from the former by about three inches, is full and rounded, and, although about twice the size of the posterior horn, does not exceed it in height; it is placed above the nostril, to which, however, its hinder margin is slightly posterior.

A most striking feature of this individual, and one which I have not seen exemplified in three adult heads of this species from Burmah which I have examined, nor have seen referred to in any description of the species, is the long drooping hair of the margins of the ears. In adult males and females the margins of the ears are fringed with strong erect black hairs tipped with brown, and almost one inch, or slightly more, in length; but in this individual these hairs are nearly five inches long, with their terminal not so bristly as their basal portions—and with this result, that the former droops downwards over the latter. It appears to me that the more delicate portion of the hairs is worn off as the animal increases in years, probably by the friction to which the ears are subjected in the creature's wanderings through the dense jungle to which it is so partial. The hairs are longest and most numerous immediately behind the tip, and shortest on the anterior margin, the three basal inches of which are all but nude. The insides of the ears are covered with very short greyish hairs about the sixteenth of an inch in length.

The shoulder-fold is the most strongly marked of all the folds, which are much less decidedly developed than in the two other species of Asiatic Rhinoceros. It is prolonged over the back from side to side, and below passes on to the outside of the limb, for a short way at the elbow-joint. At the latter point there is another strong fold

below it, passing upwards and forwards across the outside of the limb, on the front aspect of which it bends inwards and slightly downwards to the chest. The fold before the haunch, between the groin and the back, is short and less strongly marked than the shoulder-fold; and its upper extremity is on a level with the head of the femur, its direction being downwards and somewhat forwards. The two folds on the back of the haunch are very short, and the internal extremity of the upper one is on a level with the lower margin of the genital orifice; the fold below them, across the leg, passes forwards and downwards, and is the most indistinctly marked of all the folds, almost disappearing when the limb is stretched backwards. The more or less pendulous fold of the neck arises from behind and below the level of the ear, and is continuous below with its fellow of the opposite side; the skin behind this fold is loose, and forms another fold, which disappears, however, when the neck is raised.

The tubercles of the skin are so small and flat that the skin is almost smooth; they are about the eighth of an inch in diameter; and each is surrounded by a shallow sulcus, in which usually four bristles are placed. The latter structures are erect and about one inch in length, and are rather richly distributed, being especially numerous on the lower parts of the sides, on the front of the metacarpal and on the back of the metatarsal joints, and less so on the cheeks, throat, and sides of the lower jaw; while, anterior to the eyes, the face appears to be nude, except on the anterior surface of the pendulous upper lip, which has strong bristles set widely apart. On the upper half of the trunk the bristles posterior to the shoulder-fold are almost white in some lights, with a rufous tint in others, while those anterior to the shoulder-fold are dark brown; on the lower half of the trunk and on the limbs they are black, and on the sides of the belly and over the wrist and heel they are depressed and somewhat curly; on the neck and head they are shorter and almost white. The hairs on the two margins of the lower third of the tail increase in length from above downwards, the apical hairs being about six inches in length, black at the base, and dark brown throughout the rest of their extent; the upper two thirds of the tail are covered with light-coloured bristles.

The general colour of the dry skin is ashy grey; but when moist it becomes a light brown. The axillæ and under surface of the groin, and the creases formed by the folds of the body and neck when these are extended, have a fleshy tint.

The animal is remarkably quiet, considering that she is chained by her four feet between two trees. During night she becomes very restless, and on several occasions has contrived, by stretching her hind legs to the utmost, to reach a strongly built brick wall, which she has butted down with her head. Her restlessness rather increases with the dawn, which is the time when tropical animals that are not exclusively nocturnal in their habits are most active in their movements and in their search after food. After the sun is fairly up and she has been satiated by a hearty meal, she lies down on her side, and sleeps until the blazing sun has half run his course between the me-

ridian and the horizon ; she then rises, and once more feeds in the rapidly fading twilight.

She is fed on pulse and grass, but has a special liking for the thick fleshy stems of the plantain and for the small branches of the mango-tree, which she devours with evident pleasure, her powerful jaws crushing with ease young twigs about an inch in diameter, each closure of the living mill exhaling a fine aroma, in which she revels, and which recalls to the bystander the gustatory fragrance, so to speak, of that prince among fruits. Like her kith and kin she is very fond of water, and has a special predilection for a muddy hollow close beside her, in which she wallows, delighting to bury her huge head in the slimy ooze.

She has a peculiar habit of squirting out her urine to a great distance, sending it out behind her nearly twenty feet, a habit which may be the means by which the male is made aware of her presence in the dense recesses of her native forests, where smell is probably the sole guide by which the sexes become aware of each other's presence.

Since writing the above, I have learned from my friend Lieut. Bourne that a smooth-skinned Rhinoceros is said by the Cossyahs to occur in their hills, two days' journey to the south of Charyolah. These men know *Rhinoceros sondaicus*, so that it seems very probable that *R. sumatrensis* extends into the heart of the Cossyah hills.

3. On *Manouria* and *Scapia*, two Genera of Land-Tortoises. By John Anderson, M.D., Calcutta.

[Received January 15, 1872.]

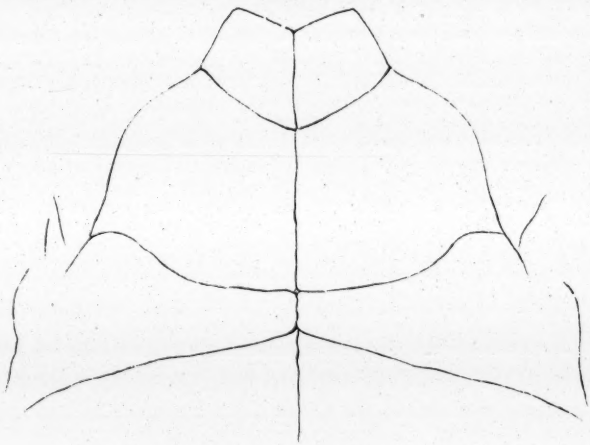
I have all along been so much struck with the similarity of the carapace and body of *Manouria emys* to those of the Land-Tortoise of Arakan (*Testudo phayrei*), that the probability forcibly suggested itself to me that the two supposed forms were one and the same. Of the former Tortoise the Indian Museum of this city possessed two nearly perfect shells and one thorax, the latter in no way distinguishable from the thoraces of the perfect shells. Of *Testudo phayrei* the museum possessed two specimens—one Blyth's type, and the other the deformed specimen which he has lately stated he gave to Dr. Falconer for examination. All these specimens of *Manouria emys* and of *T. phayrei* are characterized by a divided caudal; and their general form and all their plates, with the exception of the pectorals, are so alike that, if I simply had had the carapaces to deal with, I could not have separated them as distinct species. Turning, however, to their sterna, three of them were referable to *Manouria*, and two to *Testudo*. The three specimens of so-called *Manouria* were from one locality in Cachar, and Blyth's *T. phayrei* was from Arakan. The two sterna of the former, the thoraces of which measure respectively $20\frac{3}{4}$ inches and $19\frac{3}{4}$ inches in length, varied in the distances intervening between their pectoral plates. The largest

sternum (fig. 7, p. 137) had the pectoral plates separated from each other by the interval of only 2 inches, while in the other and shorter individual the same plates did not approach each other by 4″ 5‴ (fig. 8, p. 137). In the typical example of *T. phayrei*, on the other hand, the pectoral plates formed a suture of 1″ 4‴ (fig. 5, p. 136).

The next facts in connexion with these shells, which are otherwise identical, are these, that those which have the pectoral plates apart have concave, while those which have them forming a suture have flat sterna—two facts which are full of significance.

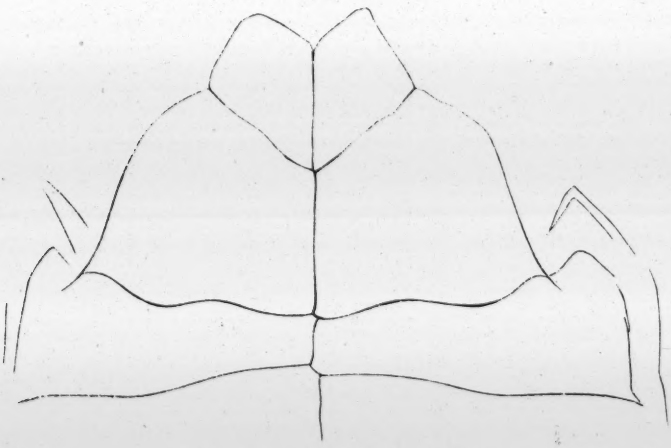
Keeping in mind the intimate connexion that subsists between the faunæ of Assam, Cachar, and Arakan, and being impressed with the foregoing facts, I asked the assistance of Capt. Butler at Lumajooting, in the Naja hills, to the east of the Brahmaputra, in procuring certain rather large Land-Tortoises, which he had informed me were found in his district. I forwarded to him drawings of the sterna of *M. emys* and *T. phayrei*; and in return he sent me three living Tortoises and two perfect shells, four of the specimens having flat, and one a concave sternum. The thoraces of all these individuals in no way differ from the thoraces of my first specimens; and the four with flat sterna are true *T. phayrei*, and the individual with the concave sternum has the separated pectorals of *M. emys*. Capt. Butler's specimens are all from one locality in Assam, to where I had anticipated it was likely *T. phayrei* would extend. Having thus proved that *T. phayrei* and *M. emys* are associated together in Assam, in the same localities, and keeping in view the facts that the animals are apparently identical, that the thoraces in no way differ from each other, that the pectoral plates of individuals referable to *M. emys* present variations in their size, and so approximate to each other as to lead directly into *T. phayrei*, and that the same plates in individuals which would be referred to this species may either have a broad or very narrow suture, the conclusion is forced upon me that the two so-called species are one and the same—*Testudo emys*, Müller,—and for the cogent reason that, beyond the variation of the pectorals, they present no other points of difference. From the circumstance that all the specimens having flat sterna, and therefore probably females, have the pectorals more or less united, while, on the other hand, the individuals with concave sterna, and therefore those which I suppose to be males, have these plates varying in their degrees of approximation, I am inclined to regard the first form of pectorals as, to a certain extent, distinctive of the female, and the second as characteristic of the male *Testudo emys*, Müller. There is, however, an element of uncertainty whether or not these two types of pectoral plates are exclusively sexual, because, as the *Manouria* type varies from widely apart to approximated pectorals, and the *T. phayrei* type from a broad to a very narrow pectoral suture, it is possible, nay probable, that further and other modifications may be brought to light. But the specimens before me indicate only two types of variation (one characteristic of the flat, and the other of the concave sterna)—the former being a suture of variable intensity in the middle line, the second a pectoral plate of variable development between the

Fig. 1.



Pectoral plates of *Testudo phayrei*, ex. *a*.

Fig. 2.

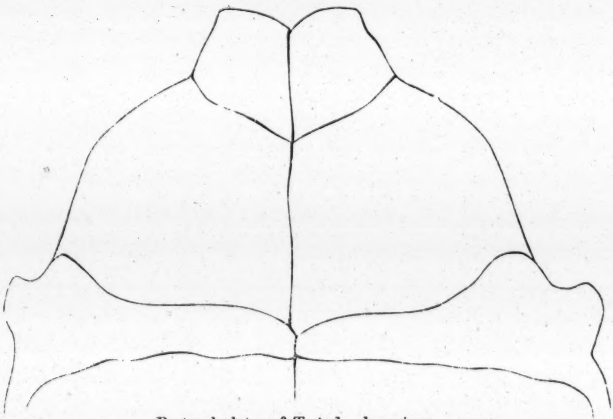


Pectoral plates of *Testudo phayrei*, ex. *b*.

middle line and a short distance internal to the inner margin of the axilla.

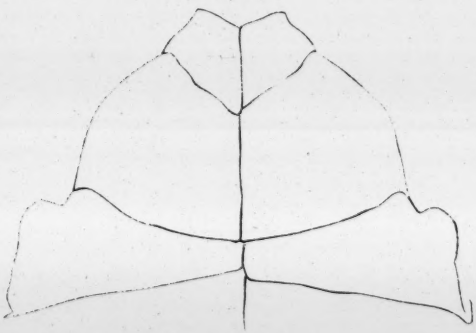
The figure of *Testudo emys* given by Müller* agrees in all its details with my specimens with non-united pectoral plates; and, if the latter peculiarity is excepted, it also represents Blyth's *T. phayrei*.

Fig. 3.



Pectoral plates of *Testudo phayrei*, ex. *c*.

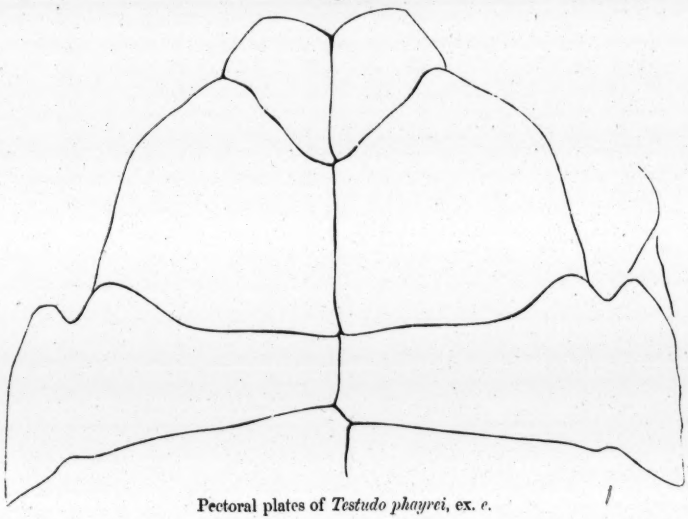
Fig. 4.



Pectoral plates of *Testudo phayrei*, ex. *d*.

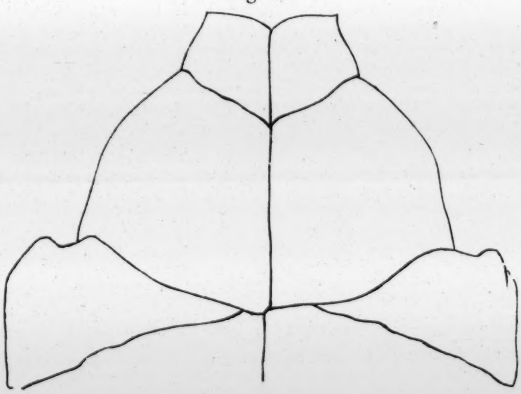
* Verhandl. Rept. xxxiv. t. 4.

Fig. 5.



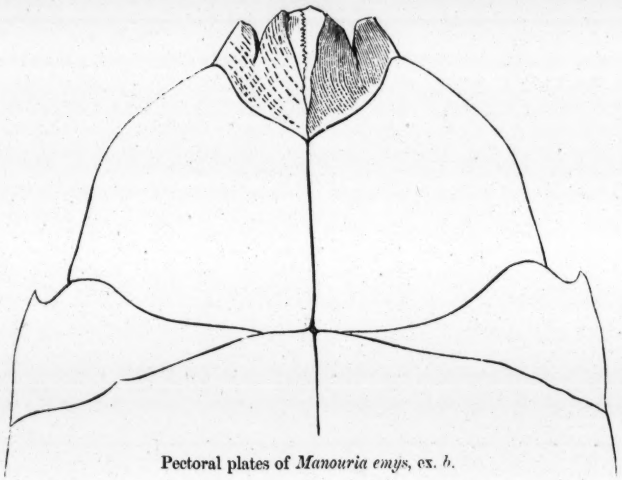
Pectoral plates of *Testudo phayrei*, ex. *e*.

Fig. 6.



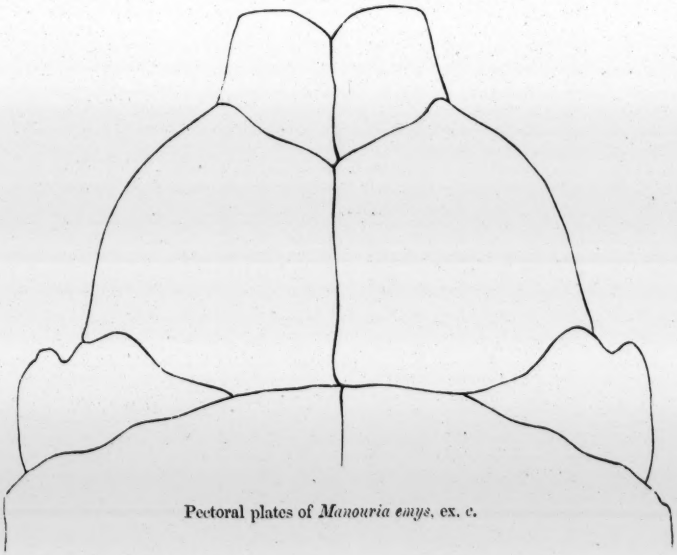
Pectoral plates of *Manouria emys*, ex. *a*.

Fig. 7.



Pectoral plates of *Manouria emys*, ex. *b*.

Fig. 8.



Pectoral plates of *Manouria emys*, ex. *c*.

Dr. Gray's figure of *M. fusca** is a very good representation of *T. phayrei*, from which, I believe with Dr. Gray, it in no way differs, except in respect of its pectoral plates; and I am supported by the authority of Dr. Günther that the former is *T. emys*, Müller.

The question, therefore, here obtrudes itself, Is the genus *Manouria* a natural one? I think not, and for the very cogent reasons I have stated, viz. that the sole character on which it rests is shown, by the series of specimens before me, to be the extreme limit in one direction of the development of the pectoral plates, and that the individuals which show this variation are Tortoises with concave sterna, which would indicate that they are males; while those with flat sterna exhibit the opposite pole of variation in its greatest intensity, and, so far as we at present know, never have their pectoral plates wholly apart.

The accompanying table gives the measurements of the eight examples before me.

Measurements of shells of Testudo emys.

	1.	2.	3.	4.	5.	6.	7.	8†.
Greatest length, in straight line, from caudal notch to nuchal plate	20 9	20 0	19 9	18 8	18 0	18 0	15 2	13 3
Greatest length, over curve of back, from caudal notch to nuchal plate	24 0	23 6	23 2	22 10	21 6	21 2	17 6	15 3
Greatest breadth, over middle of back (anterior third of 3rd vertebral), from lateral ridge to lateral ridge	21 9	22 0	20 0	20 9	19 3	19 6	15 9	14 4
Greatest breadth, by callipers, over middle of back	14 9	14 6	13 9	14 0	14 0	14 3	11 9	10 9
Distance between pectoral plates	2 0	...	4 5	...	...	...	1 7	
Breadth of pectoral suture	...	...	...	1 4	0 4½	1 0	...	0 6
Breadth (internal) of nuchal plate	1 5	1 1	1 6	1 7	1 5	1 6	1 0	1 6
Length (internal) of nuchal plate	1 5	1 1	1 3	1 5	1 6	1 6	1 0	0 11
Length of sternum, from gular to caudal notch	16 0	...	18 3	17 3	16 4	16 3	14 6	12 6
Depth through centre of abdominal plates	...	...	8 0	8 9	8 8	8 4	7 4	5 9

When the genus *Manouria* was first established, and even many years afterwards, great importance was attached by some descriptive zoologists to the divided caudal, which led Dr. Gray to refer this Land-Tortoise to the *Emydidæ*. The same naturalist, however, has recently described true Land-Tortoises with divided caudals. Moreover, in his latest publication on Shield Reptiles‡, he characterizes

* Proc. Zool. Soc. London, 1860, pl. xxxi.

† Nos. 1, 3, and 6 have concave sterna; No. 2 has no sternum; and all the other sterna are flat; No. 4 is the type of *T. phayrei*; and Nos. 5, 6, and 8 are living examples from Assam.

‡ Suppl. Cat. Shield Rept. B. M. 1870, p. 3.

his suborder *Tylopoda* as distinguished by the caudal shields being united into one, but at the same time refers *Manouria* to it. This genus he distinguishes by its widely separated pectorals, and places it in a section which he designates *Manourina* and *Manouriana*, thus venturing, from such imperfect materials as two Malayan specimens in "a bad state" and one of them "deformed," and one Australian example of the Tortoise, to settle questions of classification*. It seems to me, after a careful consideration of these variations, that they admit of no other explanation than that which I have offered.

I removed the skull of the type of *Testudo phayrei*; and on comparing it with the figure given by Dr. Gray of the skull of *Scapia falconeri*, I have failed to detect any characters by which to separate the two as distinct species, far less as distinct genera. This seems to me, to quote Dr. Gray's own words, to be "one of those instances which ought to teach naturalists caution in determining species without the examination of all the parts of the animal, the skull as well as the thorax"†; for here is the skull of *T. emys* placed in one genus, and its shell bandied about from genus to genus, and the mutilation of this unfortunate Tortoise even carried to the extent of its head being placed away from its body in one section of the *Testudinidæ* and its thorax and sternum allocated to another.

The history of the skull of so-called *Scapia falconeri* is now well ascertained, my predecessor Blyth having distinctly stated that he made over the second example of his *T. phayrei* to Dr. Falconer to examine, as Dr. Falconer had expressed his opinion that *T. phayrei* displayed a special affinity to his huge Siwalik fossil Tortoise, the *Colossochelys atlas*. The thorax and sternum of this specimen are still in this museum; but the skull which Dr. Falconer took away with him for further examination, and forgot to return, was made over conditionally to the British Museum by Dr. Falconer's executors, and figured by Dr. Gray and named by him *Scapia falconeri*. I now send a series of figures of the skull of the other specimen of *T. phayrei*, which is considerably larger than the example Dr. Falconer examined. To facilitate comparison, the figures represent the same views of the skull as those depicted by Dr. Gray of *Scapia falconeri*. Beyond a few unimportant differences, due to individual peculiarities and the different ages of the specimens, the two skulls are identical.

Dr. Gray says that the skull of *Manouria fusca* is distinguished from that of *S. falconeri*, the general form of which it somewhat resembles, by its more slender and weak zygomatic arch; but, on turning to Dr. Gray's description of the genus *Manouria*, it is obvious that his only acquaintance with the skull of *M. fusca* was obscured by the skin of a stuffed specimen, and that he has never directly handled the bones of the skull; so that little weight can be attached to such observations.

I propose now to describe the species *T. emys* from living specimens, and to indicate what appears to be the synonymy of the species.

* Suppl. Cat. Shield Rept. p. 31. † Ibid. p. 7.

TESTUDO EMYS, Müller & Schlegel.

Testudo emys, Müller & Schlegel, Verhand. Nat. Gesch. Rept. 1839, xliv. pp. 30, 34, tab. 4.

Manouria fusca, Gray, Proc. Zool. Soc. 1852, p. 133; Ann. & Mag. Nat. Hist. 1855, vol. xv. p. 68; Cat. Shield Rept. 1855, p. 16; Proc. Zool. Soc. 1860, p. 395, pl. xxxi.

Geoemyda spinosa, Gray (in part), Cat. Shield Rept. p. 16.

Testudo phayrei, Blyth, Journ. As. Soc. Bengal, xxii. p. 639, 1853, xl. p. 77.

Teleopus luxatus, Leconte, Proc. Acad. Nat. Sc. Philad. vii. p. 187, 1854.

Manouria emys, Müller & Schlegel; Günther, Rept. Brit. India, 1864, p. 10.

Manouria emys, M. & S.; Theobald, Journ. Linn. Soc. Lond. x. p. 10; Cat. Rept. As. Soc. Bengal, 1868, p. 9.

Testudo indica, Theobald, Cat. Rept. As. Soc. Bengal, 1868, p. 8.

Testudo (*Scapia*) *falconeri*, Gray, Proc. Zool. Soc. 1869, pp. 167, 169–171, fig. 1; Suppl. Cat. Shield Rept. 1870, pp. 6–8, fig. 1.

Shell slightly depressed, somewhat flattened over the second and third vertebral plates. The gular plates project a little beyond the anterior margin of the shell. The extremities of the anals reach close to the middle of the caudals, and are at a slightly higher level than the extremities of the latter plates. The anterior third of the sternum is bent upwards and forwards, the direction of the gular plates being well forwards. The first, second, and third anterior marginal plates are slightly upturned, and the ninth and tenth are also turned upwards, the external half of each caudal being more or less concave. The anterior and posterior margins in the foregoing localities are slightly sinuous.

The nuchal plate is somewhat variable, but generally, when viewed internally, is unguiculate, as broad as long, concave from side to side, and convex from before backwards, and slightly upturned in front; from without, it is much broader than long, its anterior margin slightly projecting, and feebly reverted. All the vertebral plates, with the exception of the fifth, are hexagonal, and all are broader than long, the second and third considerably so. The nuchal margin of the first vertebral is the narrowest, and is contained about three times in the posterior border of the plate. The suture with the first marginal is half the dimension of the posterior margin of the plate, and its lateral border is about one-sixth the length of the latter less than it. In some the lateral margins of the first vertebral plate diverge from behind forwards, so that the plate is broader in front than behind, while in others they are nearly parallel. The anterior lateral margins of the second vertebral are each contained two and a half times in its anterior margin, and the posterior lateral margins are each half as extensive as the posterior margin of the plate. The anterior and posterior sutures of the third vertebral are equal; and the anterior and posterior lateral margins are also equal, and each half the breadth of the first-mentioned sutures. The fourth verte-

bral is only a little longer than broad; and its posterior is contained more than twice in the anterior margin of the plate, and equals the anterior lateral margin, which is about one half of its own length less than the posterior lateral margin. The length of the fourth vertebral slightly varies. The fifth vertebral has seven margins, if the caudal sutures are counted as two, which they are. The length of the shield is slightly variable; but it is always broader than long; the anterior lateral margin, which is the broadest, only slightly exceeds one of the caudal sutures. The greatest breadth of the two caudals exceeds the breadth of all the vertebrals, but approximates to the fifth. Each vertebral and costal has a central, slightly elevated areola, with concentric grooves external to it, the areolæ being most prominent on the first and fifth vertebrals and on the first costal. On the costals the areola is slightly above, and on the marginals slightly below their centres, and in the latter it is somewhat depressed, not convex as on the other shields, and has the lateral ridge continuous with the free margin of the shell immediately above it. The gular plates are subject to variation; they may be either more or less quadrangular, or the figure may be modified to the triangular. These figures depend on the angle at which the external margins of the plates are placed to their common suture. The two plates anteriorly are separated by a rather deep notch, but not so marked as the anal, which is broad and deep. The concave sterna have the pectoral plates separated by an interval of variable extent, but in none do the pectorals touch each other; while the flat sterna have the pectorals forming a suture of variable dimensions. When the suture is broad, the external margin of the pectoral plate is in connexion with one half of the internal margin of the fourth marginal, and with the whole of the same border of the fifth marginal, forming also a very small suture with the sixth marginal; while, when the pectoral suture is narrow, or when the plates are apart, the fifth marginal forms a suture with the abdominal plate. In others, when the pectorals approximate without touching, however, this contact of the fifth marginal and abdominal plates is reduced to a very small surface, so that the pectoral nearly touches the sixth marginal plate. The axillaries and inguinals are small; and there are usually two of each, the most external being the largest.

The colour of the shell varies with age: in the young it is a dull olive-brown, the areola being light greenish and horny, while in the adult it is wholly black.

The head is of nearly equal depth throughout, nearly flat on its upper surface behind, and slightly arched above before the eyes to the tip of the snout, which projects beyond the nostrils, which are in a line with the inner angle of the eye. The loreal region is rather narrow and concave. The front of the upper jaw is convex from above downwards, from the nostrils to its lower margin, which projects very slightly beyond the lower jaw. There is a feeble ridge from the outer border of each nostril to the margin of the upper jaw, and a more obscure median ridge between the nostrils. The symphysis of the lower jaw is convex downwards and backwards, the under margin of

the ramus being nearly parallel with a line drawn along the upper surface of the head. The cutting-edge of the lower jaw has a sharp-pointed hook at its extremity; and the margin of the upper jaw is slightly crenulated. The external ear is large, oval, and placed obliquely downwards and forwards, its upper margin being in a line with the lower border of the visible portion of the eyeball. The eyes are well developed, and the distance between their anterior angles and the nostril is about one third less than the interval between their posterior angles and the ear. The anterior frontals are subtruncately triangular, their posterior margins, on the upper surface of the head, being halfway between the anterior angles of the eyes and the tip of the snout; but their lateral margins are in contact with the uppermost line of small scales which occur on the eyebrow and arch downwards and forwards to the anterior angle of the eye. The postfrontals are broadly truncated in front; and their united posterior margins only equal the anterior margin of one shield. Two or three large superciliary shields, with three or four lines of small shields or scales external to them. Vertical about the size of one of the postfrontals, with some enlarged occipital shields behind it; the upper surface of the head posterior to this covered with elongated, or sometimes nearly quadrangular plates, which rapidly decrease in size from before backwards, and cease on the occiput. A very long plate over the ear, with one or two rather large postocular plates before it, and two or three rows of small shields below the former. A few small shields on the chin. Neck, throat, and the skin of the body, with the exception of the parts to be mentioned, covered with small granular scales. Anterior surface and upper border of fore limbs covered with large, triangular, strong scales, about one inch in length, like the scales of *Manis*. Posterior surface of hand covered with much smaller, transverse rows of rounded scales; two or three large, strong, somewhat pointed scales between the outer and inner claws, with two rows of small scales between them and the bases of the other claws. Claws strong and pointed, the longest (the third) about one inch and a quarter in length.

The fore surface of the hind limb covered with small flat plates, which are largest on the knee, and a few small, but larger, scales at the base of the claws. Heel and external surface of sole covered with a group of eleven or twelve large, thick, strong, pointed scales, those on the margin slightly recurved*. The internal surface of the lower part of the limb clad with rather large rounded flat scales or plates, which rapidly diminish in size as they are traced upwards, degenerating into granules halfway between the sole and the knee. External to the tail there is a group of three large powerful spines, with two or three smaller ones around them; the largest spine is the spine nearest but one to the anus. The area surrounding these spines is covered with moderately large flat scales.

The tail is 2 inches in length, and is covered, on its upper surface, with two or three rows of small plates.

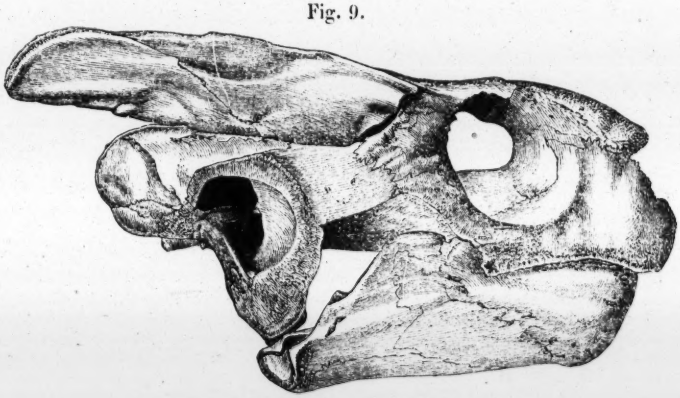
* The area between these large spines and the base of the claws is covered with small flat plates. The claws are strong and pointed, and resemble those on the fore foot.

The measurements of the head are as follows:—

	in.	lin.
Occiput to tip of snout	4	$9\frac{1}{2}$
Anterior angle of eye to anterior ridge of nostrils	1	1
Posterior angle of eye to margin of ear	0	$11\frac{1}{2}$
Depth below eye	1	3
Breadth behind eyes, greatest	2	4
Breadth before eyes (anterior angle)	1	$2\frac{1}{2}$
Breadth behind nostrils	0	8
Breadth behind ear	2	4

Scales of head and body black, the skin brownish grey; iris reddish brown. The neck can be extended about 9 inches; it is very thin, and the skin hangs loosely on it.

Fig. 9.



Skull of typical specimen of *Testudo phayrei*.

The skull (fig. 9) of Blyth's type of *T. phayrei*, the measurements of the shell of which I have given in the foregoing table, is 3″ 9‴ from the posterior extremity of the mastoid to the tip of the premaxillaries, and 2″ 7‴ in breadth across the postfronto-malar suture, which is the greatest breadth of the skull; *i. e.* the breadth of the skull is very little more than two thirds of its length. The temporal fossa is large, and the occipital spine rather deep and projecting slightly upwards, strongly backwards, and considerably beyond the posterior border of the mastoid. The distance between the mastoids equals that between the orbital border of the maxillo-malar sutures of the two sides. The fronto-parietal area is depressed, the depression being almost entirely confined to the parietals, the frontals and prefrontals arching downwards and forwards, their area being elongately quadrangular, and the lateral margin parallel. The anterior border of the prefrontals is almost straight. The maxilla is

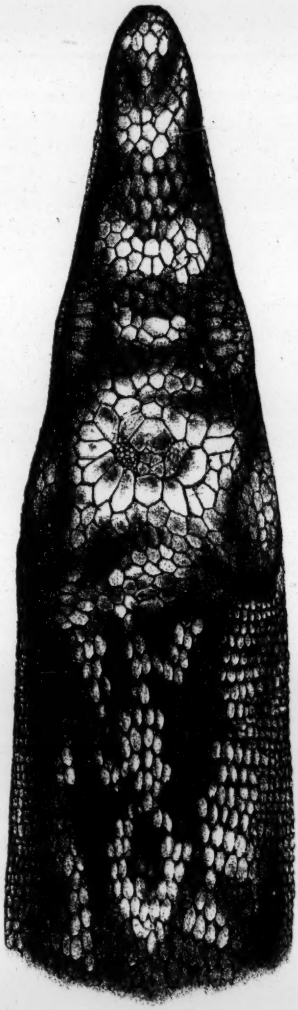
concave from before backwards. The zygomatic arch is thin and rather deep, but the depth is apparently variable; for one side of the skull (the left) is nearly 1‴ less than the other, which is 5‴. The external nares are truncately triangular, almost quadrangular; the premaxillary anterior margin is directed downwards and slightly backwards. The other characters I shall borrow from Dr. Gray's description of his genus *Scapia*:—"The groove on the palate very deep and wide. The upper jaw with three narrow ridges—one on each side of the margin, and a short thinner one intermediate between them; the outer margin high and without any teeth. Lower jaw with a sharp edge, a rather acute sharp edge in the front part, and with a sharp inner ridge rather more than half the length of the side, separated from the outer edge by a deep groove."

Measurements of skull.

	in.	lin.
Posterior border of mastoid to tip of premaxillaries	3	9
Breadth across zygomatic arch	2	7
Depth of zygomatic arch (right side)	0	5
Depth of zygomatic arch (left side)	0	4
Breadth across fronto-prefrontal suture	1	$0\frac{3}{4}$
Breadth across prefronto-maxillary suture	1	1
Breadth across premaxillaries (maxillary margin)	0	$5\frac{1}{2}$
Distance between fronto-nasal process of maxillaries (above)	0	8
Distance between fronto-nasal process of maxillaries (below)	0	5
Prefrontal suture, extremity of, to upper margin of premaxillaries	0	7
Distance between mastoids	1	9
Posterior border of mastoid to posterior extremity of parieto-postfrontal suture	2	1
Greatest breadth of parietals (postfrontal)	1	2
Length of frontals, greatest	0	7
Length of prefrontals along suture	0	$9\frac{1}{2}$
Anterior extremity of parietals to end of occipital spine	2	11
Length of alveolar border of maxilla	1	$6\frac{1}{2}$
Length of alveolar border of mandible	1	4
Distance between articulating surface of tympanic and posterior extremity of alveolar surface of upper jaw	1	1
Distance between articulating surface of tympanics	1	5
Palatal groove, breadth in front	0	$3\frac{1}{4}$
Greatest breadth	0	10
Total length of ramus of lower jaw	2	7
Greatest depth	0	10

This species of Tortoise has evidently a very wide range, extending from Assam, through Cachar, Arakan, and the moist regions of Burmah, through the Malayan peninsula as far east as Java, extending to Sumatra, and doubtless to other islands, , if the locality Australia, given by Dr. Gray for a specimen in the British Museum be correct, spreading to the south-east as far as that continent.

BRITISH
2800c73
MUSEUM

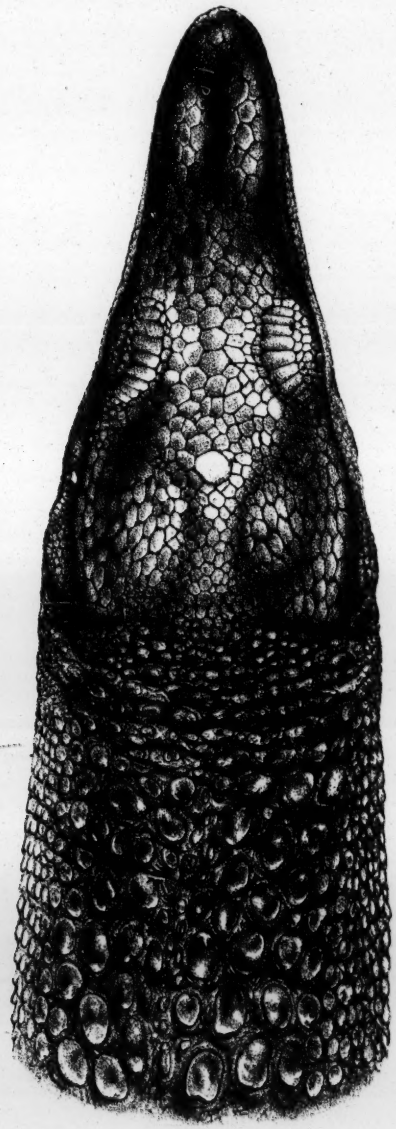


C. Berjeau del. et lith.

Mintern Bros imp.

HYDROSAURUS CUMINGII.

BRITISH
280673
MUSEUM



C. Berjeau del et lith.

Mintern Bros. imp.

HYDROSAURUS NUCHALIS

4. On two Species of *Hydrosaurus* from the Philippine Islands. By Dr. Albert Günther, F.R.S., F.Z.S.

[Received January 26, 1872.]

(Plates VII. & VIII.)

A distinct species of *Hydrosaurus* from Mindanado was described as long ago as 1838, by W. Martin, in the 'Proceedings' of this Society (p. 69), under the name of *Varanus cumingii*. This extremely well characterized species has never since been recognized; and I felt much gratified when, on looking over the specimens of this family in the British Museum, I discovered the typical specimen sent by the late H. Cuming to the collection of the Zoological Society. It was obtained for the British Museum in 1857, and has still the original labels attached to it:—one in Cuming's handwriting, signifying the locality, "Isle of Mindanado;" and the other written by Martin, with the date of reception into the Society's collection, and the names of the sender and species.

The description by Martin is so complete that I need not add any thing else but a figure of the upper parts of the head and neck, showing the unusually large plates on the crown of the head, by which the species will be readily recognized. Also the scales of the neck and along the middle of the back are conspicuously larger than in *Hydrosaurus salvator*, convex, and ovate in shape (see Plate VII.).

In a collection from the Philippine Islands, recently presented by Harry J. Veitch, Esq., to the British Museum, there is a large *Hydrosaurus* which, although it resembles *H. cumingii* in having large convex dorsal scales, differs in the pholidosis of the head, and is distinguished from all its congeners by the extraordinary development of the nuchal scales. It may be characterized thus:—

Hydrosaurus nuchalis. (Plate VIII.)

All the scutes on the upper surface of the head are of nearly uniform small size, with the exception of a series of enlarged transverse scutes in the superciliary region; a central scute in the middle of the crown of the head is also larger than the others. The scales on the neck are very large, larger than any of the scutes of the head, flat, and somewhat distant from one another, smaller scales being mixed with the large ones. The dorsal scales gradually diminish in size in the middle and hind part of the length of the body, but are throughout conspicuously larger than on the sides of the back. Claws of moderate strength, the anterior stronger than the posterior. Teeth strong, slightly compressed, curved backwards, and finely serrated behind. Scales of the belly smooth, in eighty-three transverse series between the gular fold and the loin. Upper parts brownish black, with indistinct ovate yellowish spots arranged in

transverse rows. Upper and lateral parts of the head nearly uniform brownish black. Mandible with traces of the cross bands usually observed in *H. salvator*. Tail black, with numerous scales yellow; its terminal portion with very broad black bands. Most of the scales of the fore legs are yellow, of the hind legs black. Lower parts yellow, faintly reticulated with blackish.

The specimen is 50 inches long.

5. On a new Genus of Characinoid Fishes from Demerara. By Dr. Albert Günther, F.R.S., F.Z.S.

[Received January 26, 1872.]

A small collection of fishes made at Goedverwagting, a plantation on the coast of Demerara, and presented by F. J. B. Beckford, Esq., to the British Museum, contained an example of an apparently new genus allied to *Lebiasina*, but with a totally different form of the snout and mouth. It may be characterized as follows:—

Nannostomus.

Dorsal fin placed nearly in the middle of the length of the body; adipose fin none; anal short; ventrals below the dorsal; caudal deeply forked. Body oblong, covered with large scales; lateral line none. Head of moderate size; snout subconical, with the mouth very narrow, quite anterior. Cheeks narrow, covered by the infra-orbital bones. Both jaws armed with a single series of closely set, compressed, crenulated teeth. Palatine teeth? *

Nannostomus beckfordi.

D. 8. A. 10. L. lat. 22. L. transv. 6.

Body compressed, its depth being equal to the length of the head, which is one fourth of the total (without caudal). Eye but a little less than one third of the length of the head, and nearly equal to the extent of the snout. Origin of the dorsal and ventral fins in the middle of the length (without caudal). A silvery band along the middle of the side, bordered above by a reddish, and below by a blackish band. A black spot on the lower half of the gill-cover. Caudal fin red.

Total length 30 millims.

* The typical specimen being unique and very small, it did not appear to be advisable to destroy the snout by dissection. I have no doubt Mr. Beckford will succeed in obtaining more examples, from which the details of the dentition can be ascertained.

BRITISH
28 OCT 73
MUSEUM



CASUARIUS BAUDI.

6. On Kaup's Cassowary (*Casuarius kaupi*), and on the other known Species of the Genus. By P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received January 23, 1872.]

(Plate IX.)

In the 'Journal für Ornithologie' for 1861 (p. 44) Hr. v. Rosenberg described a new species of Cassowary, of which one of his hunters had obtained a specimen on the western coast of Salawatty—and proposed to call it *Casuarius kaupi*. H. v. Rosenberg particularly states that his example was an *old male*, and distinguishes it from *Casuarius galeatus* by the entire *absence* of any throat-wattles, besides other noticeable differences.

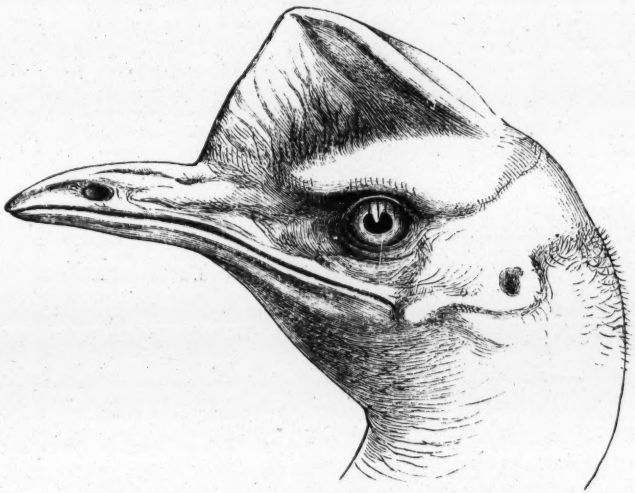
In 1866 I communicated to this Society an extract from a letter received from our Foreign Member Dr. Schlegel, stating that Bernstein had lately collected, for the Leyden Museum, on Salawatty and the adjoining coast of New Guinea seven specimens of a Cassowary, which turned out to be *Casuarius uniappendiculatus*—and that Prof. Schlegel had come to the conclusion that the so-called *Casuarius kaupi* was merely the *young* of this species, the "single caruncle not being developed in the younger bird" (see P. Z. S. 1866, p. 168*). This view, especially seeing that the two supposed species had been obtained in the same locality, I was at that time quite disposed to coincide with; and it was adopted by Mr. Gould when he figured *Casuarius uniappendiculatus* in the 'Supplement to the Birds of Australia' (plates 74 and 75). Recently, however, I have convinced myself that it is, in all probability, incorrect.

Last summer we received in exchange from the Zoological Society of Amsterdam (as already recorded in these 'Proceedings,' 1871, p. 627) a Cassowary, not quite adult, which had been captured in 1869 near Munsinam†, on the north coast of New Guinea. Mr. Westerman had previously written to me about this bird, telling me that he considered it to belong to an undescribed species. Nevertheless, from the locality, I was at first inclined to believe that it might be possibly the young of *Casuarius uniappendiculatus*, although I knew that Mr. Westerman (who was well acquainted with the latter species from having had a fine living example of it long in his possession) was not of that opinion. After further examination and comparison, however, I quite convinced myself that it could not be *C. uniappendiculatus*, being so much smaller in size than that large species, and, though very nearly adult, showing no traces whatever of a gular caruncle. It then occurred to me that our bird might be *C. kaupi* of Rosenberg, and that Dr. Schlegel might have been in error in regarding this species as the young of *C. uniappendiculatus*. Our bird certainly agreed very fairly with Rosen-

* See also Schlegel, in 'Ned. Tijdschr.' iii. p. 250.

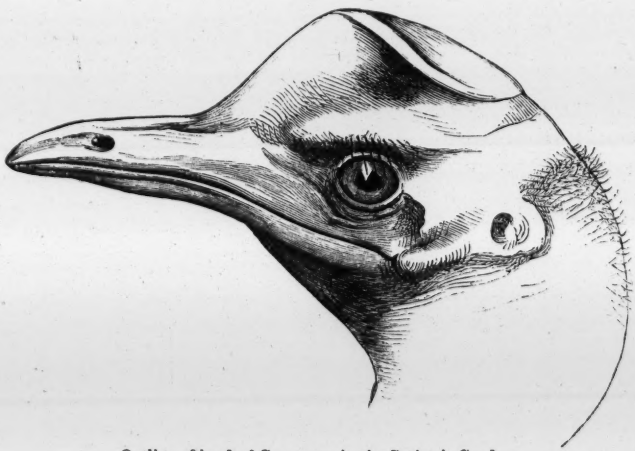
† This village is marked in the map in vol. i. of Mr. Wallace's 'Travels.' It is near Havre Dorey.

Fig. 1.



Outline of head of *Casuarius kaupi*, from cast of original specimen.

Fig. 2.



Outline of head of Cassowary in the Society's Gardens.

berg's description; and Rosenberg had expressly insisted on his specimen being adult, and showing no signs of a throat-wattle. I therefore sent a coloured drawing of our bird to Dr. Kaup, and requested him to compare it with the original specimen of *Casuarius kaupi* in the Darmstadt Museum. Dr. Kaup kindly replied to me that the figure agrees well with the specimen, which, however, is by no means perfect, the head and neck being original, and the body being made up with the skin of the same bird, but the wings and legs being wanting, and having been replaced from other sources. Dr. Kaup added that his specimen was certainly not immature. Dr. Kaup also forwarded me a plaster cast of the head of the same specimen, which I now exhibit, and which, it will be observed, agrees in shape very well with the head of our living bird, although in the latter, not being so mature, the transvertical ridge is not quite so much developed.

Under these circumstances I came to the following conclusions:—

1. That a second species of *Casuarius* occurs in New Guinea more nearly allied to *C. bennetti* than to *C. uniappendiculatus*, the only species previously known to inhabit that country.

2. That this second species should bear the name *C. kaupi*, that term having been erroneously considered synonymous with *C. uniappendiculatus*.

After having arrived thus far, I received the new part of 'Nederlandsch Tijdschrift voor de Dierkunde,' containing the fifth and concluding portion of Dr. Schlegel's "Observations Zoologiques." Here I discovered that the existence of this second Cassowary in New Guinea had been already noticed, H. v. Rosenberg having transmitted two specimens of it (obtained on the western coast of the Bay of Geelvink, nearly the same locality as that where the bird now in our Gardens was captured) to the Leyden Museum. Dr. Schlegel has referred these specimens to the Mooruk (*Casuarius bennetti*), observing, at the same time, that H. v. Rosenberg had considered them distinct, and had given them the name *Casuarius papuensis*.

Having at the present moment specimens of the true *Casuarius bennetti* and of the allied bird from New Guinea living side by side in the Gardens, we can have no difficulty in deciding that they belong to quite different species. Indeed Dr. Schlegel could hardly have fallen into the error of uniting them if he had had a specimen of *C. bennetti* for comparison. In *C. bennetti* the naked space on the throat is less extended, and the whole of the naked skin is of a uniform cobalt-blue all around. In *C. kaupi* the back of the neck is of a bright red, as are likewise the two lateral neck-stripes, and the sides and back of the head are of a bright iridescent silvery green. Nevertheless there can be no question that the two species are closely allied, being of nearly the same size, and having the casque of the same form.

In my opinion, therefore, the synonyms of the new Papuan Cassowary should stand as follows:—

CASUARIUS KAUPI. (Plate IX.)

Casuarius kaupi, Rosenb. Journ. f. Orn. 1861, p. 14.

Casuarius bennetti, Schlegel, Ned. Tijdschr. iv. p. 54.
"*Casuarius papuensis*, Rosenb. MS.;" Schlegel, *l. s. c.*
Hab. Papua.

In conclusion, I take this opportunity of giving a revised list of the six species of *Casuarius* now known to us, with their localities. They may be divided into three sections, as follows:—

a. *Casside lateraliter compressa: appendicula cervicis duplici.*

1. *C. galeatus*, ex Ceram.
2. *C. bicarunculatus*, ex ins. Aroensibus*.
3. *C. australis*, ex Australia Bor. Or.

b. *Casside transversim expansa: appendicula cervicis unica.*

4. *C. uniappendiculatus*, ex Papua.

c. *Casside transversim expansa: appendicula cervicis nulla.*

5. *C. kaupi*, ex Papua.
6. *C. bennetti*, ex Nov. Britann. et inss. Salomonis†.

7. Descriptions of two imperfectly known Species of Cyprinoid Fishes from the Punjab, India. By Lieut. Reginald Beavan, F.R.G.S., Revenue Survey Department of India.

[Received January 26, 1872.]

1. Labeo diplostomus, Heckel. (Fig. 1.)

D. 3+10. A. 2+5. L. l. 43. L. transv. 10/12.

Mouth rather narrow. Lips with an inner fold in their entire circumference; lower lip fringed. Snout produced, convex, without lateral lobes. Two barbels only, very small, hidden in a lateral groove. Eye situated in advance of middle of head. There are six longitudinal series of scales between the lateral line and the ventral fin. Scales angular, becoming minute on the breast and throat. Dorsal fin concave, anterior rays being the longest. Caudal fin deeply forked, the small outer rays considerably overlapping the tail above and below. Depth of body rather more than one fourth of its length. Length of head one fifth of total length (without caudal). Coloration uniform.

Found at Rawul Pindee, Punjab. Length 6½ inches.

* *Cf.* Schlegel, 'Nederl. Tijdschr.' iii. p. 347.

† The existence of a species of *Casuarius* in the Solomon Islands was first recorded by Capt. Hutton (Ibis, 1869, p. 352). On the 8th of October, 1869, this Society purchased of Messrs. Owen and Graham one of the birds spoken of by Capt. Hutton as formerly in the Gardens of the Auckland Acclimatization Society. It was *Casuarius bennetti*; it died September 8th, 1871.

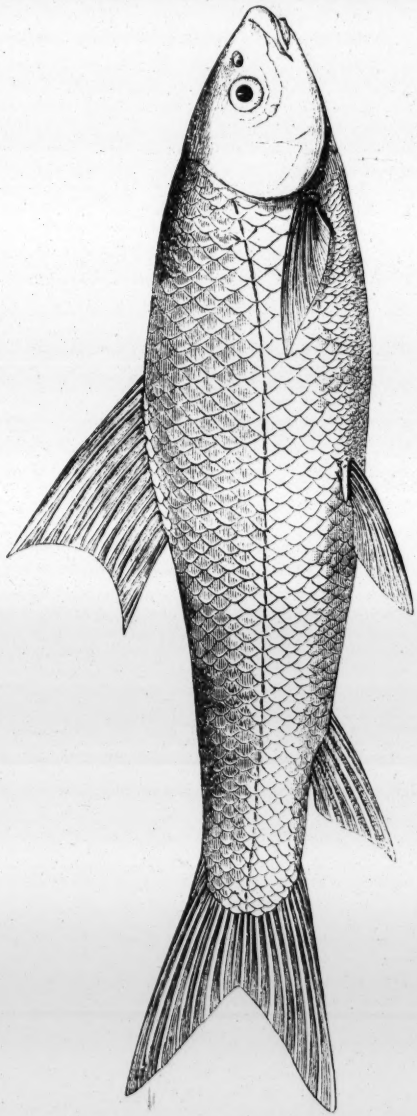


Fig. 1. *Labeo diplostomus*

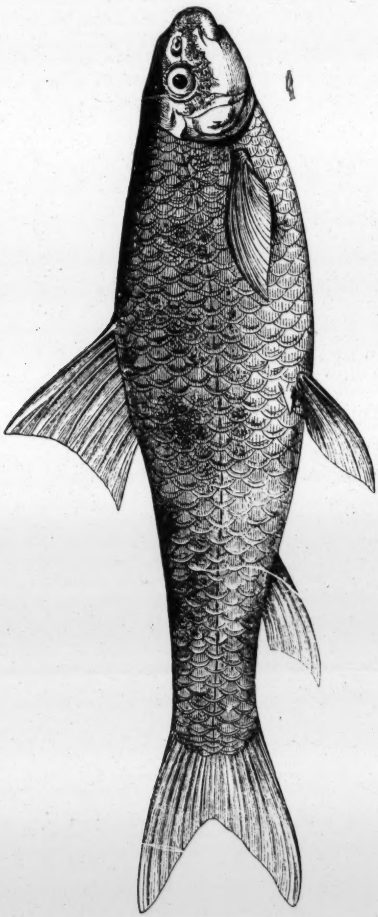


Fig. 2. *Crossochilus barbatulus.*

2. CROSSOCHILUS BARBATULUS, Heckel. (Fig. 2.)

D. 3+8. A. 2+5. L. l. 35–37. L. transv. 6/7.

Barbels four, the upper being nearly as long as the eye. Upper lip crenulated. Snout projecting. Four series of scales between the lateral line and ventral fin. Head small, being contained once and a half in the height of the body, and five and a half times in the length

(without caudal). Eye situated in the middle of the length of the head. Origin of the dorsal fin considerably in advance of that of the ventrals, and nearer to the snout than to the end of the tail. Pectoral and ventral fins thick, the former longer than the head. Body more or less marked with dark blotches in some specimens.

Rawul Pindee. Length 5½ inches.

Specimens of both the above-named species have been deposited in the British Museum.

8. On a new Species of Green Woodpecker from Southern Europe. By Howard Saunders, F.Z.S. &c.

[Received January 26, 1872.]

When my friends Messrs. Sharpe and Dresser were describing the Green Woodpecker (*Gecinus viridis*) in the 'Birds of Europe,' I lent them a specimen from Granada, Spain, which Mr. Sharpe at once perceived was not true *G. viridis*, But for the time, and in the absence of a series, we were disposed to refer it to *G. vaillantii* (Malherbe, Picid. vol. ii. p. 122, iv. pl. 82). I immediately exerted myself to obtain specimens of this bird from different parts of Spain; and I have now before me a series from four very distinct localities, all, however, south of the Sierra de la Guadarrama, which will probably prove to be in this case, as in several others, the dividing line between the northern and southern resident avifauna*.

These specimens, agreeing amongst themselves, differ so strikingly from both *G. viridis* and *G. vaillantii* that there can be little doubt of their belonging to a new and hitherto undescribed species, which I propose to call

Gecinus sharpei, sp. nov.,

after my friend Mr. R. B. Sharpe, to whom the credit of discriminating it is entirely due.

♂. G. viridi *simillimus, sed facie laterali cinerea, fascia mystacali omnino coccinea, et uropygio flavo facile distinguendus.*

♀. *Mari similis, sed gutture magis cinereo: fascia mystacali nigra.*

Obs. A *G. vaillantii* (Malh.) hæc species fascia mystacali maris coccinea et pileo feminino toto coccineo distinguenda est.

This species is principally distinguishable from *G. viridis* by the grey face and by the absence of the black streak over the eye in both sexes. Minor points of difference are the brilliant crimson moustache in the adult male, instead of lake on a black ground as in *G. viridis*, and the deep chrome-yellow on the rump in both

* In confirmation of this I may observe that I have lately examined a Green Woodpecker from the Pyrenees which is true *G. viridis*, as are all the French specimens which have come under my notice.

sexes. In *G. vaillantii* the moustache of the male is black and never red, according to Malherbe (*op. cit.*); and in the female the crimson does not extend beyond the occiput, whereas in the present species it pervades the whole of the crown.

9. Notes on the Myology of *Liolepis belli*. By Alfred Sanders, F.Z.S.

[Received December 18, 1871.]

A specimen of *Liolepis belli* having come into my possession, I think that an account of its myology may perhaps prove interesting. A detailed description of the muscles of at least one species of every family of the vertebrate subkingdom is, in my opinion a great desideratum; and a series of monographs on this subject could not fail to throw light on many questions now in dispute. In the photographs attached to this paper, I have as far as possible given the origins and insertions of the muscles, together with the adjacent points of bone, so as to give a clear idea of the mutual relations of the various parts. With regard to the nomenclature, it must be regarded as merely a tentative expression of opinion, liable to be changed at any time on the demonstration of error.

Platysma myoides (fig. 1) is the most superficial muscle on the ventral aspect of the throat; it consists of a single, extremely thin layer of muscular fibres; posteriorly it is lost in a thick stratum of dark-coloured fat, which abounds about the anterior part of the thorax; laterally it covers the mandible, and muscles attached thereto, and passes into the superficial fascia of the back of the neck; anteriorly it decussates with the fibres of the mylo-hyoid, passing through them, and being inserted into the inner edge of the mandible in front of the ectopterygoid; more anteriorly the fibres pass transversely between the two rami. This corresponds to the muscle called hyo-mandibular in *Gecko** in every respect except that it has no connexion with the hyoid bone; I may here remark that this name was given by mistake in the latter instance, it having slipped my memory that the same had been applied to a bone in fishes.

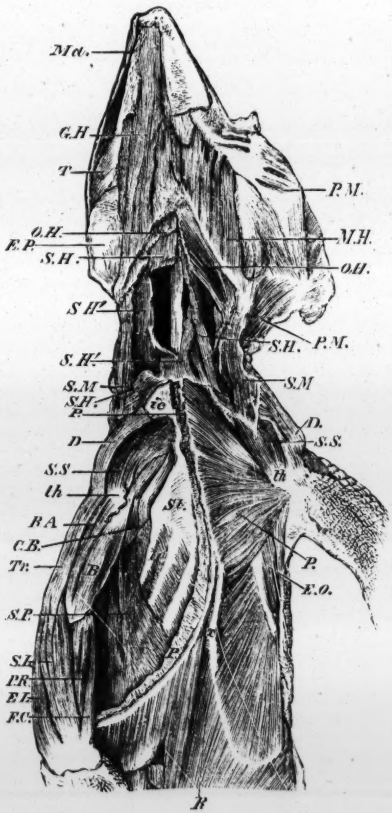
Mylo-hyoid (fig. 1) arises from rather more than two thirds of the anterior border of the proximal end of the posterior cornu of the os hyoides (thyro-hyal, Owen) and from the body of the same (basihyal); its fibres, proceeding straight forwards, are inserted into the inner side of the dentary piece of the mandible, commencing immediately in front of the insertion of the ectopterygoid; anteriorly, as above mentioned, they decussate with those of the platysma myoides; the insertion occupies not quite half the length of the ramus; internally the posterior part of the muscle is united to its fellow of the opposite side by a raphe.

Genio-hyoglossus (figs. 1 & 2) is situated dorsad of the last, and

* P. Z. S. 1870, pt. ii.

arises from the anterior edge of the thyro-hyal for about half its extent; the fibres pass forward, the deeper ones being inserted into the base of the tongue, while the more superficial are inserted into the ramus of the mandible for a short distance outside the symphysis. Cuvier* named it "génicératoïdien."

Fig. 1.



Muscles on the ventral aspect of the thorax.

Cerato-hyoid arises from near the distal extremity of the thyro-hyal, and, passing forward on the inner side of the mandible, is first

* Leçons d'Anatomie comparée, vol. iv. 2nd ed.

attached to the distal extremity of the cerato-hyal and to the adjacent portion of the membrane of the throat, and then continues its course forward to be inserted into the side of the lower jaw, just in front of the insertion of the ectopterygoid and behind that of the *platysma myoides*. Cuvier called it "cératoïdien latéral externe."

Omo-hyoid (figs. 1 & 3) arises by two heads:—one from the anterior border of the clavicle, close to its articulation with the suprascapuia; the other from the anterior border of the latter, immediately dorsad of the former. It passes downwards and forwards, and is inserted into the posterior edge of the basihyal, and two-thirds of the length of the thyro-hyal; its inner edge at the anterior part is also continuous with its fellow on the opposite side; at its origin it is covered by the sterno-mastoid, but it becomes superficial at its insertion.

The group of muscles consisting of the sterno-mastoids and hyoids on the ventral aspect of the throat are posteriorly soldered together by their lateral borders, altogether forming a sort of free edge of a crescentic shape, overlapping the real origins from the bones, stretching from side to side across the anterior part of the thorax, and being continuous with the fatty connective tissue mentioned above.

Sterno-hyoideus (fig. 1) arises from the anterior border of the interclavicle and superficial fascia, and is inserted into the posterior border of the basihyal and a small portion of the corresponding border of the thyro-hyal, dorsad of the omo-hyoid.

Sterno-hyoideus profundus (fig. 1), deeper than the last, is attached by its outer edge, at its origin, to the anterior border of the interclavicles, while its inner edge is continuous with the superficial fascia and with its fellow of the opposite side; its fibres pass forwards and outwards, and are inserted into the posterior border of the thyro-hyal, occupying about its middle third; its shape differs from the last, which is thick and narrow, in being broad and thin. Cuvier* called this muscle "sterno-cératoïdien;" in fact he distinguished all the muscles attached to the posterior cornu by the epithet "cératoïdien" to distinguish them from those attached to the basihyal; but the posterior cornu, according to Owen, is the thyro-hyal, and not cerato-hyal.

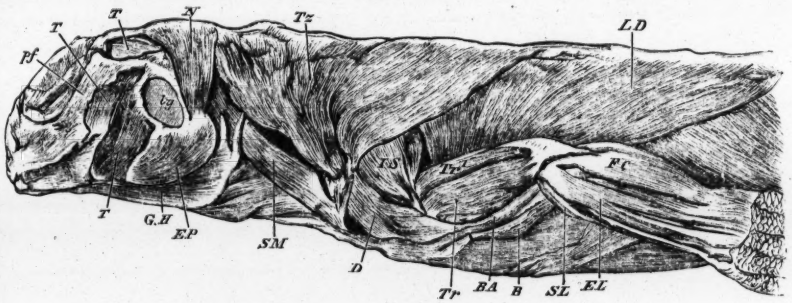
Sterno-mastoid (figs. 1, 2, & 3) is attached by its inner border to the interclavicle, in conjunction with the sterno-hyoid, while its outer border is continuous with the superficial fascia occupying the outer edge of the crescent, forming, as it were, the horns; its fibres pass forward and towards the dorsal surface, and are inserted into the posterior border of the parietal bone for nearly half its length, commencing at the point of articulation of the three bones, parietal, squamosal, and quadrate; its insertion is covered by the origin of the next muscle. It differs from the corresponding muscle of the *Gecko* in having no connexion with the clavicle.

Neuro-mandibularis (fig. 2 & 3) is a triangular muscle; its base arises fleshy from the border of the complexus; its apex is inserted into the extremity of the articular element of the mandible. This

* *Loc. cit.* p. 531.

appears to represent one of the superficial mandibular muscles of Serpents, of which Duvernoy* mentions three.

Fig. 2.



Superficial muscles on the side of head and thorax.

Temporalis (figs. 2 & 4) arises behind from the anterior surface of the os quadratum, above from the under surface of the posterior frontal and squamosal, also from the outer extremity of the parietal; it projects beneath this apophysis, forming a muscular prominence above the rectus posticus major in the neck, deriving some fibres from the posterior surface of the parietal and from the upper surface of the exoccipital; the fibres pass forward and downward, and are inserted into the posterior edge and outer surface of the coronary and into the same surface of the dentary, descending as far as the inferior border, in front of the ectopterygoid, also into the outer and inner surfaces of the supraangular and angular elements of the mandible.

Ectopterygoid (figs. 2 & 3) arises from the outer or lower surface of the pterygoid bone, tendinous from the anterior portion, fleshy from the posterior; it encloses the posterior portion of the mandible in a fleshy mass, being inserted into the supraangular, angular, and articular elements.

Entopterygoid (figs. 3 & 4) arises from the external concave border of the parietal, appearing at the vertex internal to the temporal muscle; it has also an attachment to the prootic; it is inserted into the lower border of the internal surface of the mandible behind the complementary element and immediately above the smooth space for the ectopterygoid.

The muscle internal to this, which corresponds to the two muscles in *Gecko* which I fancied represented the tensor tympani, here arises from the columella, from the membrane covering the anterior part of the brain (alisphenoid), and from the anterior and upper point of the prootic, and is inserted into the inner surface of the pos-

* Annales des Sciences Naturelles, tom. xxvi.

terior apophysis of the pterygoid for its whole length. If the os quadratum is the homologue of the malleus, as Prof. Huxley proved* in a paper published in the 'Proceedings' of this Society for 1869, and not of the incus as was formerly supposed, this position is strengthened; for although it is not actually inserted into the quadrate bone, yet it is closely connected to it by alveolar tissue; moreover in the Turkey I found a corresponding muscle described by Prof. Owen as the entotympanicus, which is actually attached to the bone in question.

Digastric arises from the point of junction of the three bones, squamosal, parietal, and quadrate; it is fleshy throughout, and is inserted into the articular element of the mandible.

Fig. 3.



Deep layer of muscles on the side of body, the os quadratum and part of the mandible removed; above *pt* is the tensor tympani?

Trapezius (figs. 2 & 3) is a thin muscular layer extending from the anterior end of the neck, as far back as to the eleventh vertebra inclusive; the anterior part is situated beneath the neuro-mandibular, and arises with that muscle from the border of the complexus; the fibres of this part proceed downward and backward, and are inserted into a point on the anterior surface of the dorsal extremity of the clavicle close to its articulation with the scapula, occupying one quarter of its length. The posterior section of this muscle arises from the spinous processes of the vertebræ from the seventh to the eleventh inclusive, by means of a thin aponeurosis: the posterior portion overlaps the latissimus dorsi; its fibres pass downward and forward and are inserted into the posterior edge of the clavicle, coinciding with the extent of its articulation with the scapula and to the anterior border of the suprascapula for nearly half its length.

Latissimus dorsi (figs. 2 & 6) arises from an aponeurosis covering the back, which is attached to the spinous processes of thirteen vertebræ, from the sixth to the eighteenth inclusive; the aponeurosis

* P. Z. S. 1869, p. 391.

is continuous with that of the opposite side, being but slightly attached to the neural spines; the fibres converge towards the ventral surface, and are inserted into the inner border of the humerus, at about the proximal end of the middle third of the shaft, by a strong flat tendon, which passes between the inner and long heads of the triceps.

Levator scapulæ (figs. 3, 5, & 6) arises from the external surface of the antero-dorsal angle of the suprascapula, and from the anterior edge of the scapula, internal to the origin of the omo-hyoid; it proceeds obliquely forwards, to be inserted into the side of the atlas.

Sterno-coracoidalis (fig. 6) arises from the inner surface of the coracoid by a flat tendon which is situated along the inner border of the subscapularis and the lower edge of the coracoid fenestra; its fibres are directed backwards, and are inserted into the posterior sixth of the inner surface of the sternum and into the base of the xiphisternum and cartilages of the second, third, and fourth dorsal ribs.

Sterno-coracoidalis externus, situated deeper than the last, is a distinct fasciculus, which arises from the inner surface of the coracoid, and, running backwards and inwards, is inserted into the whole length of the antero-lateral border of the sternum.

Serrati (figs. 1, 3, & 6) are three in number; the posterior arises from the posterior concave edge of the suprascapula for nearly its whole length: the fibres pass downward and backward, to be inserted into the free extremities of the third and fourth cervical ribs; they continue beyond this point to an additional insertion into the anterior edge of the xiphisternum.

Serratus anterior arises from the whole dorsal edge of the suprascapula, and, passing directly towards the ventral surface, is inserted into the free extremities of the first and second cervical ribs. There was another small fasciculus, arising from the antero-dorsal angle of the suprascapula, which was accidentally cut off; but I found attached to the extremity of the second cervical rib another distinct fasciculus, evidently belonging to it.

Caudal muscles (figs. 12 & 13). These have the usual arrangements; posteriorly they have six serrations on each side, three above and three below the transverse processes of the caudal vertebræ; anteriorly the dorsal and ventral serrations become deficient, while the lateral ones are continued forward to be inserted into the transverse processes of the first caudal vertebra by a pointed extremity.

Sacro-lumbalis (figs. 3, 4, & 12) arises from the posterior extremity of the ilium; the fibres, passing forward, are attached to the dorsal surface of all the ribs from the last dorsal to the first cervical; externally it is inseparable from the intercostales; internally it is easily dissected from the longissimus dorsi; posteriorly its ventral surface is continuous with the quadratus lumborum; corresponding to each rib, there occurs in its substance a tendinous intersection.

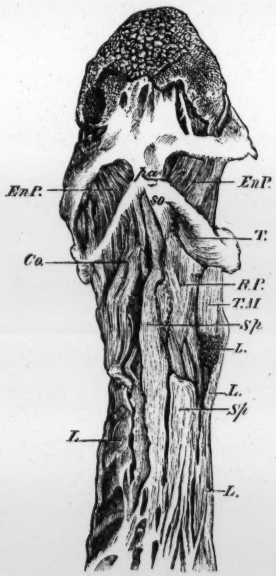
Cervicalis ascendens (fig. 5) is a continuation of the last muscle which proceeds forward from the first cervical rib, to be inserted, in conjunction with the levator scapulæ, into the body of the atlas at a

point which is level with the transverse processes of the subsequent vertebræ.

Longissimus dorsi (figs. 4 & 12) arises from the transverse processes of all the caudal vertebræ anterior to the twentieth; at its commencement it is thin and narrow, being enclosed in the caudal muscles as in a sheath; at the thirteenth it emerges and, becoming superficial, increases greatly in size; at the sacrum its ventral surface is attached to the transverse processes, and is divided from the dorsal part by a tendinous intersection; in the back it is attached to the pleurapophyses of the lumbar vertebræ and to the head of all the dorsal ribs, being situated on the inner side of the sacro-lumbalis; it is also inserted into all the cervical ribs. At the third vertebra it divides into three separate muscles, of which the

Complexus (fig. 4) is situated nearest the middle line of the back; this goes forward superficially, to be inserted into the posterior border of the parietal bone, internal to the insertion of the sterno-mastoid, and to a slight extent into the supraoccipital bone.

Fig. 4.



Muscles of the back of the neck.

Transversalis colli (figs. 3 & 5) lies more towards the ventral surface; going downwards and forward, it is inserted into the ventral

apophysis of the basioccipital in conjunction with the rectus anticus major; it also receives reinforcements of fibres from the transverse processes of the second and third cervical vertebræ; some of the lower fibres, derived with the latter from the longissimus dorsi, are inserted with the levator scapulæ and cervicalis ascendens into the atlas.

Trachelo-mastoid (figs. 3 & 4) is the third muscle which is continuous with the longissimus dorsi; it is situated between the two last, and, proceeding straight forward, is inserted into the posterior surface of the exoccipital, external to and behind the articulation of the squamosal, exoccipital, and quadrate bones.

Spinalis dorsi is a continuation forward of the central part of the dorsal half of the caudal muscular mass; becoming separated at the thirteenth caudal vertebra, it occupies the space between the neural spines and the zygapophyses; in the dorsal region superficial tendinous slips are developed from the muscular fibres and are inserted severally into the spines of the dorsal vertebræ: opposite the third cervical vertebra it divides; the superficial part is continued onwards, to be inserted into the posterior edge of the parietal and into the supraoccipital close to the middle line internal to the complexus after the manner of a ligamentum nuchæ; the deeper portion terminates in three divisions; the superior is attached to the posterior edge of the neural spine of the atlas, the middle one to the dorsal surface of the posterior zygapophysis of the same vertebra, while the the inferior one is attached to the ventral surface of the zygapophysis of the same.

Rectus posticus major (fig. 4) arises from the neurapophysis of the atlas and the neurapophysis and neural spine of the axis, and is inserted into the supraoccipital beneath the complexus, and also into the posterior border of the exoccipital for nearly its whole length.

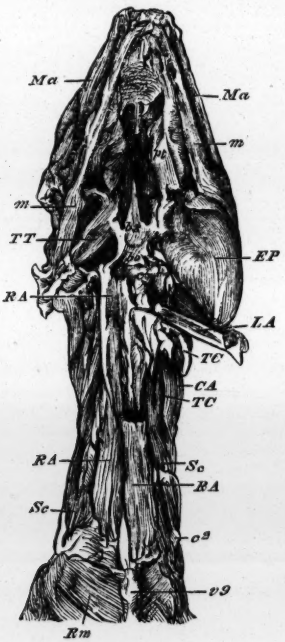
Rectus anticus major (fig. 5) arises from the inferior surface of the centrum and the hypapophysis of the atlas, and from the hypapophyses only of the vertebræ from the second to the sixth inclusive, and from the centra of the seventh and eighth, and also from the inner surface of the proximal end of the third and fourth cervical ribs, and is inserted into the posterior and inner border of the basioccipital.

Scalenus anticus (fig. 5). The muscle which appears to correspond to this arises from the centra and the sides of hypapophyses and ventral surfaces of the transverse processes of the axis and two following vertebræ, and is inserted into the first and second cervical ribs and into the centra of the fifth and sixth vertebræ; at its insertion it is continuous dorsad with the sacro-lumbalis, and posteriorly with the intercostales.

Rectus abdominis (figs. 1, 9, & 10) arises from the base of the xiphisternum for rather more than one third of its extent; the inner border is attached to that of its fellow of the opposite side throughout its whole length; posteriorly it is inserted into the ischio-pubic ligament, which in this Lizard has the same attachment as in *Gecko*, it also gives a muscular slip to be inserted into the hamular process of the pubis, which, I am of opinion, corresponds to the pyramidalis.

Obliquus externus abdominis (figs. 9 & 13) arises by eight muscular digitations, the two anterior being attached to the extremity of the penultimate and to the posterior border of the last cervical rib, the remaining six being attached to the ribs at the external border of the

Fig. 5.



Prævertebral group of muscles.
c^1. Atlas. c^2. Second cervical rib. v^9. Centrum of ninth vertebra.

sacro-lumbalis, a point which might be regarded as their angles. The anterior portion of this muscle is inserted into the anterior border of the long xiphisternum beneath the pectoralis major; the remainder into the borders of the rectus abdominis and the extremity of the tenth dorsal rib, which is much longer than the others, and reaches by a free cartilaginous extremity nearly to the pelvis; the postero-dorsal border of the muscle is free and does not reach the pubis; the fibres are directed downwards, backwards, and towards the ventral surface, and they contain in their substance several fine tendinous intersections.

Obliquus internus and *transversalis* are attached by their ventral edge to the border of the rectus abdominis, and by their dorsal to all the dorsal ribs, to the four anterior at the point of junction of the vertebral with the sternal segments, and to the point corresponding in the posterior ribs; posteriorly they are attached to the side of the quadratus lumborum; their anterior attachments were missed; they are both situated on the ventral or visceral side of the ribs: the fibres of the internal oblique go from above downwards and forwards; those of the transversalis are transverse.

Intercostales (figs. 6 & 13) are continuous with the external border of the sacro-lumbalis; they fill up the spaces between all the ribs. Anteriorly they commence by a tendinous border, which has the following attachments, viz. one end to the point of junction between the scapula and the coracoid bone, dividing the two sections of the subscapularis, the other end to the external angle of the sternum; from this tendinous border are derived two ligaments, one joining the posterior angle of the coracoid, the other joining the long head of the triceps muscle. That part which fills up the spaces between the four anterior dorsal ribs consists of two layers: the external has the fibres directed backwards and slightly downwards; this extends only to the junction of the vertebral with the sternal ribs; of these the anterior set differs from those that follow, inasmuch as they arise from the last cervical and are inserted into the second dorsal rib, not being attached to the first rib: the internal layer belongs more especially to the sternal ribs, filling up the interspaces between them and the sternum; they form the tendinous border above mentioned. The fibres are directed backwards and slightly upwards. The part of the intercostales which fills up the spaces between the six posterior dorsal ribs appears to belong to the external layer, as the fibres run in the same direction; in addition there are six separate muscular slips, which pass downwards and forwards from near the free ends of these six ribs, of which the two anterior are inserted into the fourth sternal rib, and extend for a short distance beneath the external layer, between the fourth and fifth and the fifth and sixth dorsal ribs: the remaining four are lost between the external and internal oblique; these seem to represent the internal layer, as the direction of the fibres is the same. There is also a muscular layer which appears to be a continuation of the external intercostal; it arises from the posterior border of the tenth dorsal; and being inserted on one side into the hamular process of the pubis and the edge of the rectus abdominis, and on the other into the border of the sacro-lumbalis, it forms an arch over the pubic muscles and fills up the space left vacant by the deficiency of the external oblique in this region.

Retrahentes costarum are arranged as in *Gecko*; the anterior slip arises from the centrum of the first dorsal vertebra, and is inserted into the penultimate cervical rib; the posterior passes from the tenth dorsal to the eighth rib; the point of insertion corresponds to that of the internal oblique and transversalis. In this specimen it was much less easily separated into distinct slips than in *Gecko*, which arose, perhaps, from its being somewhat damaged.

Quadratus lumborum arises from the anterior edge of the sacrum; by its ventral surface it is attached to all the six lumbar ribs; its insertion is into the posterior surface of the last dorsal rib.

Pectoralis major (fig. 1) arises from the posterior border of the inner end of the clavicle, from the interclavicle, and from the central line of the whole length of the sternum, also from the postero-lateral border of the same, and from the concave edge of the extremely long xiphisternum, as far as its extremity: the anterior fibres go backwards and outwards, the middle go directly outwards, and the posterior directly forwards; all converge and are inserted into the inner border of the tuberosity of the humerus.

Deltoid (figs. 1, 2, & 3) arises from the anterior surface of the clavicle for rather more than half its extent, and, passing in front, it emerges posteriorly round its dorsal border, receiving a reinforcement of fibres from its posterior surface; it is inserted into the external border of the humerus just beyond the tuberosity. This appears to represent the clavicular portion of the deltoid; and in this specimen I think that the scapular portion is wanting.

Supraspinatus (figs. 1 & 3) arises from the greater portion of the outer surface of the coracoid, occupying the bone bordering the coracoid fenestra anteriorly, and the tongue of bone between it and the coraco-scapular fenestra; it also covers the coracoid half of the latter; it is covered by the deltoid and is inserted into the summit or anterior point of the tuberosity of the humerus; a few fibres are inserted into the head of the bone itself and into the capsular ligament.

Teres minor (fig. 3) arises from about half the coraco-scapular fenestra, and from the surface of the scapula in front and dorsad of the same; near its insertion it is bound down by an aponeurosis, connecting the long head of the triceps with the head of the humerus; it then passes beneath the outer head of the same muscle to be inserted into the inner edge of the dorsal surface of the humerus a very short distance beyond its head.

Infraspinatus (figs. 2 & 3) arises by a somewhat semicircular origin from the outer surface of the suprascapula, commencing anteriorly from the point of articulation with the clavicle, and extending nearly to the postero-dorsal angle, leaving a space at the antero-dorsal angle for the levator; from this origin the fibres converge and are inserted by a thin flat tendon into the outside of the humerus, immediately beyond the insertion of the supraspinatus, between it and the insertion of the deltoid. The muscle which in the Frog arises from the suprascapula was considered by Dugès* to correspond to the "sous-épineux et grand rond."

In detailing the myology of *Gecko*, I ventured to name these three muscles thus on account of their insertions resembling in their arrangement the corresponding insertions in anthropotomy—the supraspinatus occupying the summit of the great tuberosity of the humerus, the infraspinatus the middle, and the teres minor the lower of the three depressions on that apophysis. This arrangement

* 'Recherches sur l'ostéologie et la myologie des Batraciens,' Paris, 1835.

was more apparent, though not more real, in the *Gecko*, because there the teres minor was inserted nearer the external surface of the bone, and consequently all the three insertions, being closer together, were visible at once. At the time of writing that paper I was away from England; but since my return I have seen Prof. Rolleston's paper* "On the Homologies of certain Muscles connected with the Shoulder-joint," in which he goes far to prove that the "epicoraco-humeralis" (which was Mr. Mivart's name for the supraspinatus) corresponds to the subclavius; but these differences of interpretation are reconciled by Mr. Galton's paper "On the Myology of the *Orycteropus capensis*," in the same volume, in which the author shows that the subclavius in that animal has, among other insertions, one into the fascia covering the supraspinatus. Another piece of evidence bears on this point: I believe that the nerve which in anthropotomy supplies the supraspinatus, arises from the same cord of the brachial plexus and close to the one which supplies the subclavius, so that the muscle in question really corresponds to the subclavius at its origin and to the supraspinatus at its insertion.

Biceps (figs. 1, 2, & 6) is represented only by its coracoid head. This arises fleshy from about the posterior half of the lower border of the coracoid fenestra, and forms a broad thin membranous tendon, which passes over the humeral joint and developes a fleshy belly in the arm, which is inserted into the contiguous surfaces of the ulna and radius by a tendon which forms the distal edge of the insertion of the next muscle.

Brachialis anticus (figs. 1 & 2) arises from the outer surface of the shaft of the humerus; commencing at the root of the tuberosity and extending to the distal extremity of the bone, it passes into the forearm in company with the last muscle, and is inserted by muscular fibres into the coronoid process of the ulna and into the surface of the bone beyond, being also attached to the flexor edge of the articular surface of the radius.

Coraco-brachialis longus (fig. 6) arises fleshy from the posterior point of the coracoid bone, and is inserted into the lower end of the humerus, for rather more than one third of its length, on the inner and lower surface immediately above the condyle.

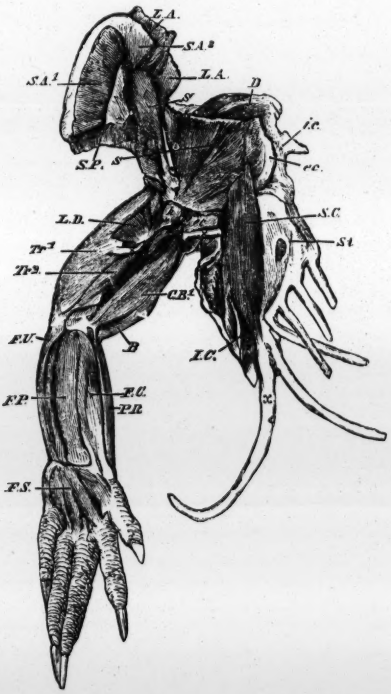
Coraco-brachialis brevis (figs. 1 & 6) arises from the outer surface of the posterior angle of the coracoid, being covered by the central tendon of the biceps; it is inserted into the lower surface of the humerus for about two thirds of its extent, commencing immediately beyond the head; it has also an attachment to the capsular ligament of the shoulder-joint.

Triceps (figs. 1, 2, 3, & 6) in this specimen has three heads, since the outer one does not divide into two as happens in *Gecko*. The outer head arises from the outer or dorsal surface of the shaft of the humerus for its whole length, commencing immediately below the head of the bone. The middle or long head arises by a flat tendon from the posterior edge of the scapula, close to the glenoid cavity; it is attached to the dorsal edge of the head of the humerus by a

* Trans. Linn. Soc. vol. xxvi. pt. 3.

tendinous slip which binds down the teres minor. From the middle of the inner edge of this head arises a tendon which is attached to the tendinous anterior border of the intercostales. The inner head commences, narrow, immediately beyond the proximal articular extremity of the humerus; it occupies the whole of the inner surface of the shaft of the bone in front of the insertion of the latissimus dorsi. These three origins are united together into a strong tendon, in which is developed a sesamoid bone, and which is inserted into the proximal end of the ulna.

Fig. 6.



Muscles on the inner aspect of the shoulder-girdle and arm.
× Tendons of intercostals.

Subscapularis (figs. 3 & 6) is divisible into two sections; the first arises from the centre of the outer surface of the scapula for about one third of its extent, from the whole of its posterior border, and

from rather more than one fourth of the anterior and lower part of the inner surface of the suprascapula. The second section arises from nearly four fifths of the inner surface of the coracoid; its fibres converge, and end in a short flat tendon which is joined by the tendon of the first section, the whole being inserted into the internal edge of the head of the humerus and into the capsular ligament of the shoulder-joint.

Pronator radii teres (figs. 1 & 6) arises from the internal condyle of the humerus, proximad of the origin of the next muscle, and is inserted into the anterior edge of the radius for rather more than half its length. This muscle does not occur in *Gecko*.

Flexor carpi radialis (figs. 1, 2, & 6) arises from the inner condyle of the humerus, distad of the last, in common with the flexor perforans, from which it is inseparable. At its origin below it is inserted into that bone of the carpus to which the radial side of the annular ligament is attached, and further sends a tendon to be inserted into the anterior edge of the base of the first phalanx of the pollex.

Flexor perforans digitorum (fig. 6) arises from the inner condyle, in common with the last, and from the whole length of the ulna. It divides into two sections: one joins the flexor carpi ulnaris; the other, which is the larger of the two, developes a broad tendon occupying the flexor surface of the wrist. Over the carpus there is a sesamoid bone in its substance; distally it divides into five tendons, one going to the last phalanx of each digit. From the deep surface of the broad part of the tendon arises a muscular slip, which is inserted into the carpus. On the superficial surface of the same part are developed three muscular slips: the first joins the perforatus tendon of the second digit on the radial side; the second in like manner joins the perforatus tendon of the third digit; the third joins the perforatus tendon of the fourth digit, all on the radial side; the latter also joins the extra tendon which belongs to the perforatus of the same digit. In addition there are three muscular slips which arise from the deep surface of the tendon and are inserted each into the base of the first phalanx of the second, third, and fourth digits respectively.

Flexor carpi ulnaris (figs. 6 & 8) arises by two heads,—one from the posterior surface of the humerus immediately proximad of the elbow-joint, but nearer the outer than the inner condyle; the other arises from the proximal extremity of the ulna. It occupies the posterior border of the forearm, and, receiving a strong reinforcement of fibres from the flexor perforans, it is inserted into the pisiform bone of the carpus.

Flexor perforatus digitorum (fig. 6) is wholly situated in the palm. It is primarily divided into four slips, of which the third is again divided into three, for the third and fourth digits; the whole arises from the annular ligament and pisiform bone. The first slip, in addition to its common origin, also arises from the whole length of the metacarpal bone of the pollex, and is inserted into the base of the first phalanx of the same by a short and broad tendon on each side, between which the tendon of the perforans passes.

The second slip has a longer and more slender tendon, which is perforated, the two halves joining again after the passage of the perforans, and being inserted as a single tendon into the base of the second phalanx of the second digit; the radial half is joined by the tendon from the slip of the perforans, as mentioned above. The third slip has three secondary fasciculi arising from it; the one for the third digit gives off two tendons, of which one passes on the radial side of the perforans tendon, and, being joined by the tendon of a supplementary slip from the broad part of the perforans tendon, is inserted into the base of the third phalanx of the third digit; the other, passing on the ulnar side of the perforans tendon, is inserted into the base of the second phalanx of the same digit. The fourth digit monopolizes the remaining two secondary fasciculi of the third slip; each of these gives origin to a slender tendon, which, passing on each side of the perforans tendon, unite to be inserted into the base of the third phalanx of the fourth digit; in addition, the one on the ulnar side gives origin to an extra tendon, which, passing on the radial side of the perforans tendon, is inserted into the base of the fourth phalanx of the same digit, receiving the tendon of another supplementary muscular slip from the broad part of the perforans tendon. The slip for the fifth digit is inserted by two heads into the base of the first phalanx, the perforating tendon passing between.

Adductor quinti digiti arises from one of the bones of the second row of carpals, and, passing obliquely across the palm, is inserted into the whole length of the radial side of the metacarpal bone of the fifth digit.

Interossei palmares are five in number, and are situated entirely in the palm; they arise from the second row of carpal bones, and, radiating thence, are inserted into the base of the first phalanx of each of the five digits.

Supinator longus arises from the outer side of the humerus, proximad of the outer condyle. It has an aponeurotic attachment to the outer head of the triceps; it is inserted into the entire length of the radius, receiving a large accession of fibres from the extensor communis digitorum.

Extensor longus digitorum (figs. 1, 2, & 7) arises from the outer condyle of the humerus and from the upper half of the two bones of the forearm; the radial side and deeper part is attached to the whole length of the radius, and merges into the insertion of the supinator longus. The superficial part divides into three flat tendons, the one on the ulnar side dividing more proximad than the other two; these tendons are inserted into the bases of the second, third, and fourth metacarpal bones, their edges being united by a thin aponeurosis.

Extensor ossis metacarpi pollicis (fig. 7) arises from the lower half of the ulna, and, crossing the lower part of the forearm, is inserted by a small flat tendon into the base of the metacarpal bone of the pollex, forming a triangular muscle with its base towards the radius.

Extensor brevis digitorum (fig. 7) arises from the second row of the carpal and from the bases of all the metacarpal bones, dividing into

five slips, each of which terminates in a broad thin tendon, which is inserted into the terminal phalanx of each digit; the division which belongs to the pollex differs from the others, inasmuch as it arises from the extensor surface of the bone of the first row of carpals which perhaps represents the combined cuneiform and semilunare, as it articulates with the whole breadth of the distal extremity of the ulna; it crosses the extensor surface of the carpus, and joins the slip which arises from the metacarpal bone of the pollex.

Abductor quinti digiti (fig. 7) arises from the same bone as the last; it passes along the outer side of the fifth digit, being bound down at the first phalanx, and finally joins the tendon of the extensor of that digit.

Fig. 7.



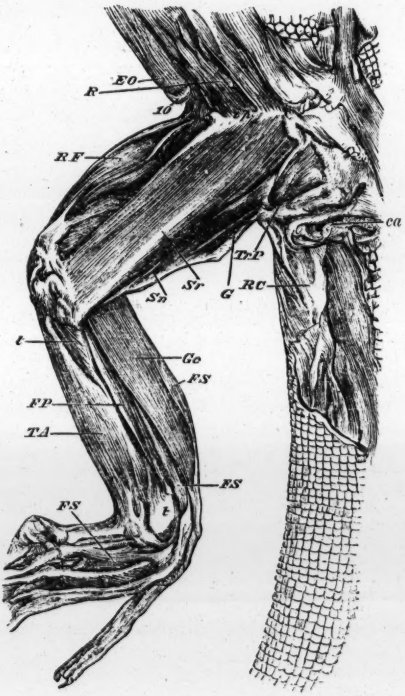
Tendons on dorsal aspect of the hand, twice natural size.

Abductor quarti digiti arises from the contiguous surfaces of the proximal extremities of the fourth and fifth metacarpal bones; its tendon is inserted into the ulnar side of the last phalanx of the fourth digit.

Three dorsal *interossei* (fig. 7) are visible on the extensor surface of the hand: the first arises from the whole length of the metatarsal bone of the second digit, and is inserted into the ulnar side of the base of the first phalanx of the pollex; the second in like manner goes from the metacarpal bone of the third to the ulnar side of the first phalanx of the second digit; the third goes from the metacarpal bone of the fourth to the ulnar side of the first phalanx of the third digit; these are all abductors, and seem to be in series with the abductors of the fourth and fifth digits.

Sartorius (figs. 8, 9, 10) arises from the ischio-pubic ligament and from the hamular process of the pubis; it is a broad muscle, covering nearly the whole ventral surface of the thigh, and is inserted by a thin but broad tendon into the inner side of the tibia in immediate proximity to its head. The origin of this muscle is placed further backward in this species than in *Gecko*.

Fig. 8.



Superficial muscles on the ventral aspect of the posterior limb.
10. The tenth rib.

Transversus perinæi (figs. 8 & 9) arises from the posterior point of the ischiatic symphysis and from the raphe between the two opposite sides; it is inserted into the tendinous intersection between the ischium and the ilium, or ilio-ischiatic ligament. A transverse section of this muscle is triangular.

Gracilis (figs. 8, 9, 10) is covered by the sartorius, except at its

origin ; it arises from the anterior border of the transversus perinæi, and by its posterior fibres from the ilio-ischiatic ligament. It is a fleshy cylindrical muscle, and is inserted into the inner side of the head of the tibia close to the internal lateral ligament ; it is also attached to the inner edge of the interarticular cartilage of the knee-joint.

Semimembranosus (figs. 8, 9, 10) is only covered by the sartorius at its insertion ; it arises from the ilio-ischiatic ligament behind the last and in conjunction with the semitendinosus ; it is broad at its origin, and is inserted by a narrow flat tendon into the inner side of the tibia within and even with the distal extremity of the internal lateral ligament and the posterior border of the sartorius.

Semitendinosus (figs. 10 & 11) arises, in conjunction with and dorsad of the last, from the ilio-ischiatic ligament ; it forms the posterior edge of the dorsal part of the thigh ; and its ventral surface forms a sort of groove for the reception of the semimembranosus. It swells out distad of its origin and then tapers off towards its distal end ; it passes in front of the origin of the soleus, to which it is attached by a strong tendon, and is inserted into the outer edge of the tibia, between it and the fibula, close to the joint, and just beyond the insertion of the pelvo-tibialis.

Pectineus (figs. 9, 10, 13) is entirely covered by the sartorius ; arising from the ischio-pubic ligament and from the part of the ischium adjacent, it is inserted into the middle third of the ventral aspect of the femur.

Pelvo-tibialis (figs. 10 & 14), in this Lizard, arises by two heads, —one, outside the last, from the margin of the pubis by means of an aponeurotic expansion, to which is also attached the iliacus externus and *flexor femoris* (?) ; the other head arises from the ischium at the inner edge of the origin of the pectineus, and is covered by the transversus perinæi, by the lower margin of the sartorius, and by the origin of the gracilis ; the two heads converge, and, uniting at the distal point of the pectineus, are inserted into the outer margin of the tibia, between it and the fibula, in close juxtaposition to the joint, passing behind the tibia, but not through the joint, as is the case in *Gecko* ; this insertion is just in front of that of the semitendinosus : it has also an attachment to the interarticular cartilage of the knee-joint.

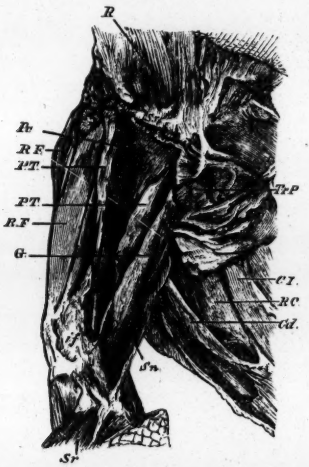
Rectus femoris (figs. 8, 9, 10, 11) has two origins, one from the pubis immediately in front of the acetabulum, the other by means of a narrow tendon from the anterior end of the ilium ; it covers the anterior and ventral surfaces of the femur, and is inserted, through the ligamentum patellæ, into the head of the tibia.

Gluteus maximus (fig. 11) arises from the ilium by a broad tendinous origin, posterior to and distinct from the last ; it covers the outer side of the thigh, and merges into the vastus externus beneath, and by its anterior border into the same. In *Gecko* it appears to be part of the rectus ; but here it has a distinct origin.

Biceps femoris (figs. 11 & 12) is represented by the pelvic origin only ; it arises from the posterior end of the ilium, and, passing down the thigh, is inserted by a flat tendon into the outer side of the fibula

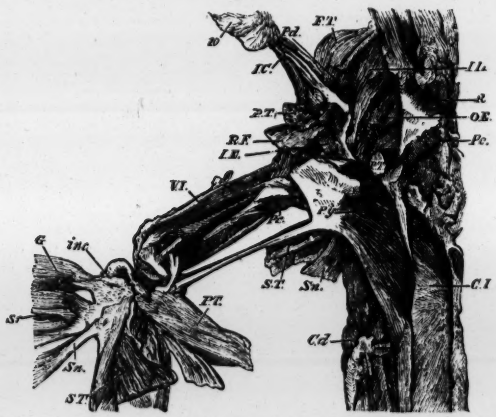
a short distance from its head, passing beneath the origin of the peronæus primus.

Fig. 9.



Second layer of muscles on the ventral aspect of the thigh.

Fig. 10.



Deep muscles on the ventral aspect of the thigh. 10. The tenth rib. Ischio-pubic ligament turned back.

Coccygeus inferior (figs. 10 & 13) appears as a continuation forward of the inferior section of the caudal muscles; it arises from the extremities of the hæmal spines of the caudal vertebræ from the tenth to the third; posteriorly it is superficial to the pyriformis. It is inserted, partly muscular and partly tendinous, into the extremity of a triangular apophysis which exists on the posterior border of the ischium.

Retractor cloacæ (fig. 9) arises from the under surfaces of the transverse processes of the caudal vertebræ from the ninth to the fifth; it commences as a thin muscular slip; and passing forward it gradually becomes thicker, and, crossing superficially the ventral surface of the pyriformis, is inserted into the outer angle of the cloaca. This muscle is peculiar; it has a somewhat flattened shape, and encloses in its interior a flat membrane, composed of a sort of elastic tissue, rolled up longitudinally into a cylindrical form.

Pyriformis (fig. 10) arises from the under surface of the transverse processes and from the hæmapophyses of the caudal vertebræ from the twenty-second to the third inclusive; the posterior fibres pass forward, and the anterior ones outward, to end in a broad flat tendon, which, passing over the trochanter of the femur, is inserted into the ventral aspect of the bone at its base, immediately outside and distad of the ilio-femoral articulation. Before reaching its insertion this tendon gives origin to a narrow one, which, passing down the thigh and behind the knee-joint, joins the tendon of the gastrocnemius, and, continuing its course, is inserted into the back part of the fibula, close to the insertion of the pelvo-tibialis, which is at the contiguous point of the tibia; the ilio-ischiatic ligament passes superficially to this muscle, and forms a sort of pulley for it. Meckel* remarked of this muscle, that it "entspricht dem birnförmigen Muskel des Menschen;" but Cuvier† objected to this interpretation, on the ground that it is inserted into the lesser trochanter; and this objection has a good deal of force, as the apophysis in this specimen really appears to correspond more with the lesser than with the greater trochanter; but the muscle is not actually inserted into this process, but more towards the outside of the bone.

Capsularis (fig. 14). This small muscle, which appears almost as a part of the coccygeus inferior, arises from the internal surface of the posterior triangular process of the ischium, and, passing behind the ilium, is inserted into the upper and posterior surface of the head of the femur, close to the acetabulum, and tends to keep the head of the bone steady in its socket.

Obturator externus (figs. 10 & 13) arises from the middle line of the external surface of the ischium, on the ventral aspect of the pelvis, and from the posterior half of the inner border of the ischio-pubic foramen covered by the pectineus; the fibres converge, and, passing over the trochanter between the pyriformis and the head of the femur, turn round towards the dorsal aspect of the bone, and are inserted on that side close to the capsular ligament. I have ven-

* Vergleichende Anatomie, Theil iii. pp. 152, 153.

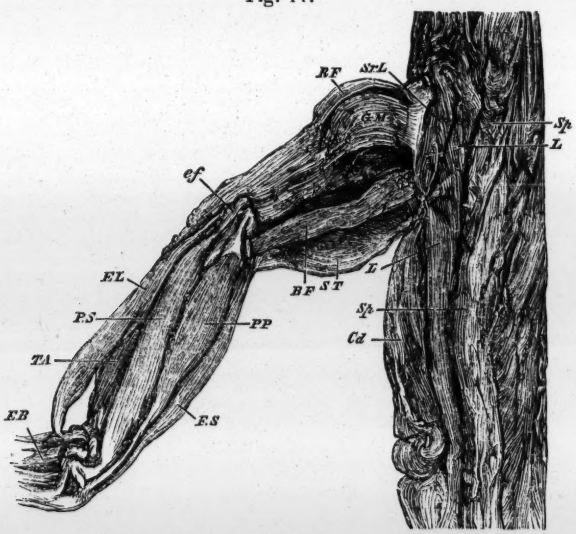
† Leçons d'Anatomie Comparée, tom. i. p. 296, 2nd ed.

tured to name this muscle *obturator externus*: as the ischio-pubic foramen represents the obturator foramen, so the muscle arising from its external surface must represent the *obturator externus* muscle; and the fact that its tendon is inserted into the outer part of the femur strengthens that position.

Iliacus (fig. 10) arises from the anterior edge of the ischium and from the posterior surface of the pubis; the fibres converge, and are inserted into the summit of the trochanter of the femur. From its position I should imagine that this process corresponds to the trochanter minor, and the muscle in question to the iliacus; for the insertion and direction of the fibres (which are the most important points) are the same as in anthropotomy.

Iliacus externus (fig. 10) appears as a detached segment of the last: it arises in conjunction with the pelvo-tibialis, and is inserted into the distal portion of the trochanter between the insertion of the last and that of the pyriformis.

Fig. 11.



Superficial muscles on the dorsal aspect of the thigh.

Flexor tibialis (figs. 10, 12, 13) arises partly from the anterior point of the symphysis pubis and partly from a fibrous raphe which extends backwards from that point over the dorsal surface of the os pubis; it is inserted into the aponeurotic expansion from which the pelvo-tibialis arises.

Flexor femoris (figs. 12 & 13) is situated behind and somewhat dorsad of the last; it arises from the same fibrous raphe, covering the flexor profundus femoris; none of the fibres are derived from the bone: passing in front of the pubis this muscle is inserted into the surface of the femur in front of the vastus externus, in close proximity to the head of the bone.

Flexor profundus femoris (fig. 13) is a flat and thin layer of muscle covering the anterior part of the dorsal surface of the pubis beneath the flexor femoris; the muscles of the two sides are continuous across the middle line; the anterior edge arises from the anterior point of the pubis; but the posterior edge is free. At the point of crossing over the front of the pubis there is a tendinous intersection which is attached to the dorsal surface of the femur close to the head; from this intersection muscular fibres run outwards, to be inserted into the femur for about one third of its length, between the insertion of the pyriformis on one side and that of the flexor femoris and vastus externus on the other.

Obturator internus (fig. 13) arises from the central line of the dorsal surface of the pubis, from the dorsal surface of the ischium, and from the symphysis of the same; it covers the posterior two-thirds of the foramen; the fibres converge, and, passing over the smooth surface in front of that part of the ilium which goes to form the acetabulum, are inserted into the side of the tendon which connects the tendinous intersection of the flexor profundus femoris with the dorsal surface of the femur as above mentioned. The tendon in question has also an attachment to the aponeurosis between the flexor tibialis, pelvo-tibialis, and iliacus externus; so that these four muscles all act together on the thigh, flexing it forward and slightly towards either the dorsal or ventral surface, through three points of attachment, viz. one on the dorsal surface close to the head, through the obturator internus and the flexor profundus, another further down the thigh and slightly more ventrad, through the flexor profundus, then, again, quite on the ventral aspect, through the flexor tibialis and iliacus externus; in addition through the flexor tibialis and pelvo-tibialis there would be a slight power of flexing the leg; this arrangement seems to indicate great power and activity in using the hind limbs.

Gluteus medius (fig. 12) arises from the ilium behind and dorsad of the ilio-femoral articulation, and in front of the origin of the biceps, being covered by the gluteus maximus; it is inserted into the posterior surface of the femur between the insertion of the next muscle and that of the vastus externus, commencing a short distance beyond the head of the bone and occupying about one fourth of its length.

Quadratus femoris (fig. 12) arises from the ilio-ischiatic ligament, behind the origin of the biceps; it passes outwards and towards the ventral surface, and is inserted into the posterior border of the trochanteric ridge of the femur; it is firmly attached to the inner border of the tendon of the pyriformis, which completely covers its insertion.

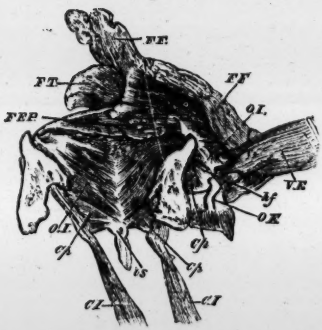
Vastus externus (fig. 13) occupies the outer and dorsal aspect

of the femur, commences anteriorly by a pointed origin projecting like a wedge between the insertions of the gluteus medius and adductor femoris; externally it is fused into the under surface of the gluteus maximus, and at its distal extremity into the outer edge of the patellar ligament.

Fig. 12.



Fig. 13.



Muscles on the external and internal aspects of the pelvis.

Vastus internus (fig. 10) is much smaller; it commences in front of the insertion of the pectineus, and covers the ventral aspect of the

femur; and its transverse section is triangular, with the base towards the bone.

Extensor longus digitorum (figs. 11 & 16) arises from the front of the external condyle of the femur by a slender tendon, which passes through a sort of groove between the heads of the tibia and fibula, forming a fleshy belly in front of the leg; it terminates in two tendons inserted respectively into the peroneal side of the second and third metatarsal bones close to their proximal extremities. This muscle is remarkably like the radial extensors of the carpus; its action is more that of a flexor of the foot than an extensor of the digits.

Tibialis anticus (figs. 8, 11, & 14) arises from rather more than the proximal half of the front, and from rather less than the distal half of the internal surface of the tibia, and is inserted into the inner side of the base of the metatarsal bone of the hallux; it further sends a tendon to be inserted into the tibial side of the same metatarsal bone for half its length.

Peronæus primus (fig. 11) arises from the outer condyle of the femur by a narrow tendon, separated from the flexor perforatus by the insertion of the biceps, over which it passes; in the leg it forms an elegantly shaped muscular mass, and is inserted into the flat surface on the dorsum and peroneal edge of the cuboid in proximity to the base of the metatarsal bone of the fifth digit. The inner edge of its tendon spreads out over the end of the fibula, receiving a muscular insertion from the tibialis posticus, and joins the under surface of the tendon of the perforans.

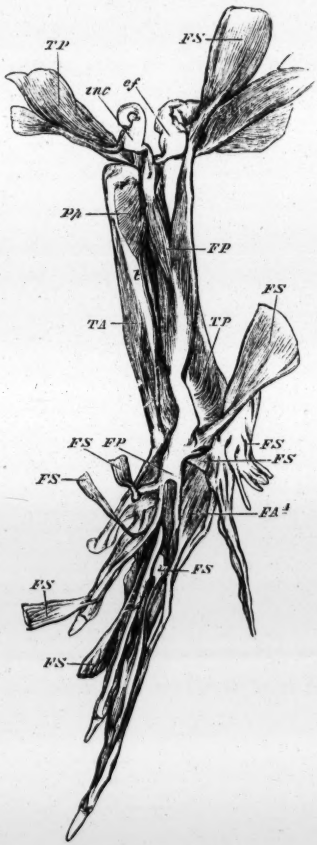
Peronæus secundus (fig. 11) arises from the head and the whole length of the outside edge of the fibula in front of the last, and is inserted into the posterior edge of the cuboid bone of the tarsus.

Gastrocnemius (fig. 8) appears to be represented only by the inner head of that muscle; it arises from the inner edge of the proximal fourth of the tibia, and from the inner condyle of the femur, covered by the insertions of the sartorius, gracilis, and semimembranosus. At its origin it receives a tendon from the pyriformis, as above mentioned, and is also attached to the interarticular cartilage of the knee-joint; it ends in a thin flat tendon, which, passing over the tarsus, is inserted into the base of the metatarsal bone of the fifth digit.

Flexor perforatus digitorum (figs. 8, 11, & 14) arises from the outer condyle of the femur by a strong but narrow tendon, which has also an attachment to the pyriformis tendon and to the interarticular cartilage of the knee-joint. This muscle forms a thick fleshy mass, having on its superficial aspect a groove for the last, which on passing the tarsus becomes covered by a strong broad tendinous expansion. The deeper muscular layer is partly inserted into the tuberosity on the inner side of the cuboid bone, while the superficial tendinous expansion is inserted by its edge to the outer side of the same bone, and by its distal extremity to the heads of the third and fourth metatarsal bones, and, besides, gives three tendons to the latter digit—one being attached to the base of the second phalanx, one to the base of the third (this splits for the passage of the perforans tendon), and another to the base of the fourth phalanx, so that

this digit is well provided with tendons; there is also an extra tendon to the base of the second phalanx of the third digit. There are five slips in the sole, which are partly a continuation of the deeper layer

Fig. 14.



Deep muscles of the leg.

of the present muscle, and partly (although still continuous) attached to the tuberosity on the inner side of the cuboid bone, and to the tibial edge of the astragalo-calcaneum; of these slips the first is

inserted by a flat tendon into both sides of the base of the first phalanx of the hallux, being perforated by the tendon of the perforans; the second is attached by a slender tendon to the side of the base of the first phalanx of the second digit; the third divides, and, after the passage of the perforans, again unites, and is inserted into the base of the second phalanx of the same digit; the fourth also divides, and is inserted into the base of the third phalanx of the third digit; it gives off a slender tendon to the base of the second phalanx of the same digit, and also receives the tendon of a small muscular slip from the broad tendon of the perforans; the fifth slip goes to the base of the first phalanx of the fifth digit without being perforated. I think it probable that the above-described muscle includes the outer head of the gastrocnemius as well as the flexor perforatus.

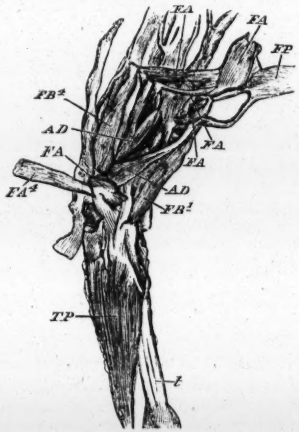
Popliteus (fig. 14) arises from the fibula for about one sixth of its length; distad of the head the fibres spread out and are inserted into the posterior surface of the tibia for about one-third of its extent.

Flexor digitorum perforans (figs. 8, 14, & 15) arises by two heads—one from the outer condyle of the femur, the other from the head and rather more than the proximal third of the posterior surface of the femur; at the point of junction the muscle is faced with a tendinous expansion, which, soon becoming a broad tendon, passes over the tarsus and occupies the sole of the foot; on the peroneal side it is attached to the peronæus primus. This tendon divides into five separate slips; that for the fifth digit is given off by itself and passes through a groove of the cuboid to be inserted into the base of the ultimate phalanx of the fifth digit: the remaining four tendons are inserted into the terminal phalanges of the first four digits; those of the third and fourth give off slips for each of the successive phalanges. A little conical muscle is given off between the second and third tendons, ending in a slender tendon which joins the perforatus of the third digit; from the superficial surface of the tendons of the second, third, and fourth digits another and larger muscular slip is derived, which joins the longest of the three tendons mentioned above as coming from the superficial tendinous expansion of the perforatus muscle; in addition a muscle arises from the anterior concave surface of the cuboid, and, being inserted into the deeper surface of the tendon of the perforans in the sole, is further prolonged by means of three slips to be inserted into the bases of the first phalanges of the second, third, and fourth digits.

Tibialis posticus (fig. 15) arises from the distal two thirds of the flexor surface of the fibula, and ends in a broad tendon, which, being closely bound down to the astragalo-calcaneum, following the curves of its surface, is finally inserted into the row of bones in front of that bone. Belonging to this muscle is a muscular slip which goes from the peroneal side of the astragalo-calcaneum to be inserted into the projecting articular process on the flexor surface of the cuboid: this muscle was marked peronæus tertius in *Gecko*; but I find that Bojanus in his 'Anatome Testudinis Europææ,' names its homologue as above, although it has no more to do with the tibia in that animal than in this.

Flexor accessorius quarti digiti (figs. 15 & 16) arises from a depression on the dorsal side of the anterior edge of the astragalo-calcaneum by a slender tendon, which, passing between this bone and the cuboid, then through a deep groove in the latter, becomes muscular in the sole, and is inserted into the tendon of the flexor perforans opposite the distal extremity of the fourth metatarsal bone; this muscle serves to give a straight direction to that tendon, which would otherwise be weakened by having its direction of effort too oblique.

Fig. 15.



Deep muscles on plantar surface of the foot. Flexor perforans turned back.

Adductor digitorum pedis (fig. 15) arises from the tibial side of the apophysis of the cuboid for articulation with the fifth digit, by a flat tendon, which gives off three muscular slips, to be inserted on the peroneal side of the base of the first phalanx of the hallux, and of the second and third digits.

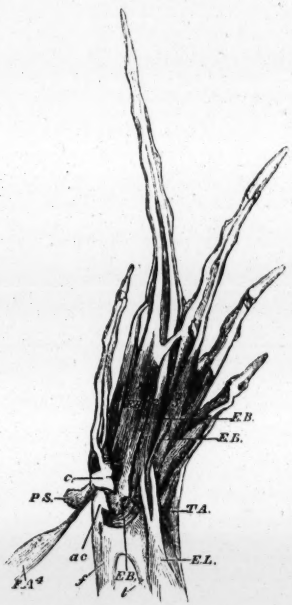
Flexor brevis quarti digiti (fig. 15) arises from the base of the same articular apophysis, on the peroneal side and slightly on the dorsal surface, and is inserted into the peroneal side of the base of the first phalanx of the fourth digit.

Flexor brevis hallucis (fig. 15), smaller than the last, arises from the edge of the tendon of tibialis posticus and the bone beneath, and is inserted into the base of the first phalanx of the hallux.

Interossei palmares are two in number: one arises from the proximal half of the tibial side of the fourth metatarsal bone, and from the opposite side of the third, and is inserted into the peroneal side of the heads of the latter and second; the other arises from the opposite sides of the second and third metatarsals, and

is inserted into the head of the second and into the metatarsal bone of hallux.

Fig. 16.



Extensor muscles of the foot.

Extensor brevis digitorum (fig. 16) is rather a complicated series of small muscular slips on the dorsal surface of foot, the first of which may be called extensor quinti digiti; it arises fleshy from a hollow depression on the cuboid; it is conical in shape, and ends in a long tendon, which is inserted into the terminal phalanx of the fifth digit.

Abductor quarti digiti is the next, arising from the tibial edge of the cuboid, and is inserted into the peroneal side of the base of the first phalanx of the fourth digit.

Extensor quarti digiti (fig. 16) consists of two separate portions. The superficial section arises from the extreme anterior edge of the peroneal side of the dorsal surface of the astragalo-calcaneum, in immediate proximity to the articulation between this bone and the cuboid, also from the whole length of the peroneal side of the metatarsal bone of the fourth digit; it terminates in three branches: one joins the extensor of the third digit; the other is inserted into the tibial side of the base of the first phalanx of the fourth digit, while

the third goes to the terminal phalanx of the same digit. The deep section arises by a rounded tendon from the depression in the centre of the dorsal surface of the astragalo-calcaneum, and from the proximal two thirds of the tibial side of the metatarsal bone of the fourth digit, also from about three fourths of the proximal end of the dorsal surface of the third metatarsal; its tendon passes through the arch formed by the superficial head, and is inserted with it into the terminal phalanx of the digit in question. The next arises from the dorsal surface of the third metatarsal, and, receiving the slip from the fourth, is inserted by a long tendon into the penultimate phalanx of the third digit.

The next arises fleshy from the peroneal side of the dorsal surface of the astragalo-calcaneum; passing over to the tibial side, it divides into three muscular slips: the first slip passes through the two tendons of the extensor longus digitorum, and, receiving a reinforcement from the peroneal side of the dorsal surface of the second metatarsal bone, ends in a long tendon, which is inserted into the base of the terminal phalanx of the third digit; the second slip likewise receives a reinforcement from the whole length of the tibial side of the second metatarsal bone, and ends in a tendon which is inserted into the terminal phalanx of the second digit; the third slip receives a reinforcement from the middle third of the first metatarsal bone, and sends a tendon to be inserted into the base of the terminal phalanx of the hallux.

No lumbricales were found in this specimen.

LIST OF EXPLANATORY LETTERS USED IN THE WOODCUTS.

Ab^{5}. Abductor quinti digiti.
ac. Astragalo-calcaneum.
A. D. Adductor digitorum.
A. F. Adductor femoris.
an. Annular ligament.
B. Biceps.
B. A. Brachialis anticus.
B. F. Biceps femoris.
bo. Basioccipital.
bs. Basisphenoid.
c. Cuboid.
ca. Cloaca.
c^{1}. First cervical vertebra.
c^{2}. Second cervical rib.
C. A. Cervicalis ascendens.
C. B. Coraco-brachialis brevis.
C. B'. Coraco-brachialis longus.
Cd. Caudal muscles.
C. I. Coccygeus inferior.
cl. Clavicle.
Co. Complexus.
co. Coronary process of mandible.
Cp. Capsularis.
C. S. Coccygeus superior.
D. Deltoid.
E. B. Extensor brevis digitorum.
ec. Epicoracoid.
ef. External condyle of femur.
E. L. Extensor longus.
E. M. Extensor metacarpi pollicis.
En P. Entopterygoid.
E. O. External oblique.
E. P. Ectopterygoid.
f. Fibula.
F. A. Flexor accessorius.
F. A^{4}. Flexor accessorius quarti digiti.
F. B^{1}. Flexor brevis hallucis.
F. B^{4}. Flexor brevis quarti digiti.
F. C. Flexor carpi radialis.
F. F. Flexor femoris.
F. F. P. Flexor femoris profundus.
F. P. Flexor perforans.
F. S. Flexor perforatus.
F. T. Flexor tibialis.
F. U. Flexor carpi ulnaris.
G. Gracilis.
Gc. Gastrocnemius, inner head.
G. H. Genio-hyoglossus.
Gl. M. Gluteus medius.
G. M. Gluteus maximus.
h. Head of humerus.

h.f. Head of femur.
i. Ilium.
i.c. Interclavicle.
I.C. Intercostales.
i.f. Internal condyle of femur.
in.c. Interarticular cartilage of knee-joint.
i.p. Ischio-pubic ligament.
I.S. Infraspinatus.
is. Ischium.
i.s.l. Ilio-ischiatic ligament.
L. Longissimus dorsi.
L.A. Levator scapulæ.
L.D. Latissimus dorsi.
m. Mandible.
Ma. Maxilla.
M.H. Mylo-hyoid.
N Neuro-mandibularis.
O.E. Obturator externus.
O.H. Omo-hyoid.
O.I. Obturator internus.
P. Pectoralis major.
pa. Parietal.
Pc. Pectineus.
Pd. Pyramidalis.
p.f. Postfrontal bone.
P.M. Platysma myoides.
P.P. Peronæus primus.
Pp. Popliteus.
P.R. Pronator radii teres.
P.S. Peronæus secundus.
pt. Pterygoid bone.
P.T. Pelvo-tibialis.
py. Pyriformis.
Q.F. Quadratus femoris.
r. Radius.
R. Rectus abdominis.
R.A. Rectus anticus.
R.C. Retractor cloacæ.
R.F. Rectus femoris.
Rm. Retrahentes costarum.
R.P. Rectus posticus.
S. Subscapularis.
S.A^{1}*&*^{2}. Serratus anterior.
S.C. Sterno-coracoidalis.
Sc. Scalenus anticus.
sc'. Suprascapula.
S.H. Sterno-hyoid.
S.H'. Sterno-hyoideus profundus.
S.L. Supinator longus.
S.M. Sterno-mastoid.
Sn. Semimembranosus.
S.P. Serratus posterior.
Sp. Spinalis dorsi.
Sr. Sartorius.
sr. Transverse processes of sacrum.
Sr.L. Sacro-lumbalis.
S.S. Supraspinatus.
St. Sternum.
S.T. Semitendinosus.
T. Temporalis.
t. Tibia.
T.C. Transversalis colli.
t.h. Tuberosity of humerus.
T.M. Trachelo-mastoid.
T.P. Tibialis posticus.
Tr. Triceps, outer head.
Tr^{1}. Triceps, long head.
Tr^{2}. Triceps, inner head.
Tr.P. Transversus perinæi.
T.T. Tensor tympani?
Tz. Trapezius.
x. Xiphisternum.
x. Tendons of intercostals.
u. Ulna.
V.E. Vastus externus.
V.I. Vastus internus.

February 20, 1872.

Professor Flower, F.R.S., V.P., in the Chair.

The following report by the Secretary on the additions to the Society's Menagerie during the month of January 1872 was read:—

The total number of registered additions to the Society's Menagerie during the month of January 1872 was 95, of which 2 were by birth, 42 by presentation, 39 by purchase, 6 by exchange, and 6 received on deposit. The total number of departures during the same period, by death and removals, was 83.

The most noticeable additions during the month were:—

1. A young specimen of the King Penguin (*Apterodytes pennanti*) from the Falkland Islands, presented to the Society by Mr. F. P. Cobb, Manager of the Falkland Islands Company at Port Stanley. The bird (which arrived on January 9th, under the kind

charge of Mr. W. H. Hyde, R.N., of H.M.S. 'Reindeer') was still in the nestling plumage (of a uniform drab brown), and at first appeared likely to do well, but very shortly died.

2. On the 18th the Council agreed to purchase a young female Giraffe belonging to Mr. Rice, which has been in the Society's custody since the 12th of October 1871. With this addition the Society's stock of Giraffes now consists of two pairs, namely:—(1) an old female, born in the Society's Gardens on the 25th of April 1853; this animal has already bred in our Gardens, and, looking to her age, can hardly be expected to breed more than once again; (2) a young male, offspring of No. 1, born in the Gardens March 17th, 1867; (3) a young male, purchased of Mr. Rice January 5th, 1870; and (4) the young female just purchased, as above mentioned.

The list of Giraffes which have lived in the Society's Gardens will now stand as follows*:—

List of Giraffes which have lived in the Zoological Society's Gardens.

No.	Sex.	How acquired.	Date.	How disposed of.	Date.
1	Female .	Imported .	May 24, 1836	Died	Oct. 15, 1852
2	Male ...	Imported .	May 24, 1836	Died	Oct. 29, 1846
3	Male ...	Imported .	May 24, 1836	Died	Jan. 14, 1849
4	Male ...	Imported .	May 24, 1836	Died	Jan. 6, 1837
5	Male ...	Born	June 19, 1839	Died	June 28, 1839
6	Male ...	Born	May 24, 1841	Presented to Dublin Zoological Soc.	June 14, 1844
7	Male ...	Born	Feb. 25, 1844	Died	Dec. 30, 1853
8	Male ...	Born	Apr. 22, 1846	Died	Jan. 22, 1867
9	Male ...	Born	Feb. 12, 1849	Sold	Apr. 27, 1850
10	Female .	Imported .	June 29, 1849	Died	Nov. 3, 1856
11	Female .	Imported .	June 29, 1849	Sold	Oct. 29, 1853
12	Male ...	Born	Mar. 30, 1852	Sold	Mar. 29, 1853
13	Female .	Born	Apr. 25, 1853	Living in the Gardens.	
14	Female .	Born	May 7, 1855	Destroyed by fire	Nov. 6, 1866
15	Female .	Born	July 16, 1859	Died	Dec. 2, 1859
16	Female .	Born	May 20, 1861	Sold	May 1, 1863
17	Male ...	Born	Oct. 7, 1861	Died	Dec. 18, 1861
18	Male ...	Born	May 8, 1863	Sold	Nov. 8, 1863
19	Male ...	Born	Sept. 24, 1863	Died	Apr. 21, 1864
20	Male ...	Born	Mar. 31, 1865	Died	Apr. 3, 1865
21	Female .	Born	Apr. 20, 1865	Sold	May 31, 1866
22	Male ...	Born	Sept. 14, 1866	Destroyed by fire	Nov. 6, 1866
23	Male ...	Born	Mar. 17, 1867	Living in the Gardens.	
24	Male ...	Purchased.	Jan. 5, 1871	Living in the Gardens.	
25	Female .	Purchased.	Jan. 18, 1872	Living in the Gardens.	

3. A collection of Land-Tortoises, presented to the Society by Dr. G. Grey of Cradock, Cape of Good Hope, consisting of twenty-three specimens belonging to the following species:—

Testudo pardalis, Bell, from Cradock.
Chersina angulata (Schweigg.), from Cradock.
Homopus areolatus (Thunb.), from Cradock.
Testudo semiserrata, Smith, from the Diamond-districts.

* See P. Z. S. 1867, p. 392.

We are greatly indebted to Dr. Grey for the pains which he has taken in getting together this series of African Tortoises, in which he informs me he has received great assistance from Mr. T. C. Scanlen, M.P. for Cradock, Cape Colony, South Africa. The two last-named species are new to the Society's collection.

In my report for January last year (see P. Z. S. 1871, p. 102) I called attention to the presence in the Society's collection of a New-Zealand Ground-Parrot (*Stringops habroptilus*), which had been deposited on the 24th of that month by Capt. R. Peck of the ship 'Mary Shepherd.' I have now the pleasure of announcing that the bird in question has been most liberally presented to us by Mr. D. L. Murdoch of Auckland, New Zealand. Of this (one of the most wonderful, perhaps, of all living birds) a specimen has been once before in the Society's Gardens (see P. Z. S. 1870, p. 798); but the present is the first that has actually belonged to us. The *Stringops* is most strictly nocturnal in its habits, and never emerges from the box in which it is kept, voluntarily, during daylight. Our specimen has no power of flight, but uses its wings to aid it in running. It is fed upon oats, apples, lettuce, carrots, and other vegetables, and appears to thrive well upon this diet.

The Secretary announced the addition to the Society's collection of a fine female specimen of the Sumatran Rhinoceros (*Rhinoceros sumatrensis*, Cuv.) from Chittagong, which had been purchased of Mr. Wm. Jamrach on the 15th inst. for the sum of £1250.

The following papers were read:—

1. Notes on the Visceral Anatomy of the Hippopotamus. By John W. Clark, F.Z.S.

[Received February 20, 1872.]

The Hippopotamus (*Hippopotamus amphibius*) on whose visceral anatomy I am going to make a few remarks was born in the Society's Gardens on January 7th. It died on the following Wednesday, and was sent to Cambridge, where it was examined by Prof. Humphry, Mr. B. Anningson of Caius College, and myself, with the view, in the first instance, of ascertaining the cause of death. The animal was a female, weighed 87 lbs., and measured, from tip of snout to tip of tail, 3′ 10″. We found the thoracic viscera perfectly healthy, and normally disposed. The abdominal viscera were equally healthy, as far as each separate viscus was concerned; but there were numerous adhesions. The stomach was firmly attached to the posterior wall of the abdominal cavity; and the spleen was so closely adherent, under a fold of peritonæum, to the inferior surface of the stomach, that it was some time before we could find it. The omentum also, in a few places, adhered to the intestines*. In the stomach we found

* I make these statements with considerable diffidence, as our knowledge of the normal anatomy of *Hippopotamus* is so scanty. I have thought it best, however, to retain them as originally written, because they record the impressions made upon us at the time of dissection.

a small quantity of milk—part of the goat's milk that had been swallowed a few hours before death. There was a good deal of meconium in the lower part of the bowel, and also a quantity of thickened matter of a yellowish colour that had all the appearance of being the fæcal residue of milk; but on this point it is difficult to speak with certainty. On the whole, I am of opinion that death was caused by want of nutriment—a result due to the abnormal conditions of the birth, which have been the same, so far as I am aware, in all the recorded instances of Hippopotami born in captivity.

Subsequently I made a more detailed examination of the different viscera. In this work I have been greatly aided by my assistant Mr. T. W. Bridge; and I have also had the benefit of the advice and suggestions of Professor Humphry.

The anatomy of the Hippopotamus was first investigated by Daubenton*, who dissected a fœtus, and gave figures of the external and internal disposition of the stomach. I am loath to find fault with a man so painstaking as Daubenton was; but I must confess that it is very difficult, if not impossible, to learn any thing from his figures, even with the actual stomach before you. Eighty-three years elapsed before any thing further of importance was done; and then Gratiolet's elaborate monograph† appeared, published after his death by Dr. Alix. He had dissected at least two individuals—a male and a female; and Dr. Alix had the opportunity of verifying his statements upon a third, that died at the Jardin des Plantes while he was arranging the MS. for publication. Excellent as this work is, there are still some points that need correction, and one at least (which I shall discuss presently) about which further information is requested by the author. The Hippopotamus that was burnt at the Crystal Palace in 1866 was dissected by Dr. Crisp, who recorded some of his observations in the Society's 'Proceedings'‡. It will be seen that the above researches have all been made on either fœtal specimens or very young animals, the oldest being that dissected by Dr. Crisp, aged fourteen months and a few days. The only record of the dissection of an adult is by Prof. Peters§, but is unfortunately very brief; what information he does give is extremely valuable. It is remarkable that nothing should have been done with those that have been born and died at Amsterdam. So far as I can discover, no notices have been published respecting their anatomy; it does not even appear that they have been dissected.

The few points that I shall dwell upon are, of course, only those that have been inadequately or erroneously noticed by preceding investigators. I shall be careful not to go again over ground that has been once thoroughly worked.

The *brain* has been described and figured admirably by Gratiolet; there is also a short note on it by Peters. I pass therefore

* In the twelfth volume of Buffon, ed. 1784.

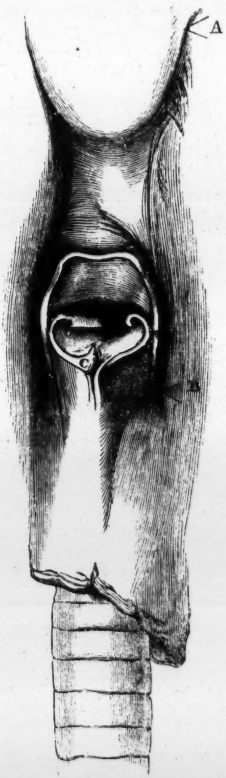
† 'Recherches sur l'Anatomie de l'Hippopotame,' par Louis-Pierre Gratiolet. 4to. Paris, 1867.

‡ P. Z. S. 1867, pp. 601 and 689.

§ Reise nach Mossambique, p. 180.

at once to the mouth. It is remarkable that while the palate, tongue, larynx, trachea, and œsophagus have all been described, the space intervening between the tongue and the œsophagus should

Fig. 1.



Tongue, larynx, and trachea of *Hippopotamus*, two-thirds natural size.
A. Root of tongue. *B.* Epiglottis. *C.* Arytenoid cartilages.

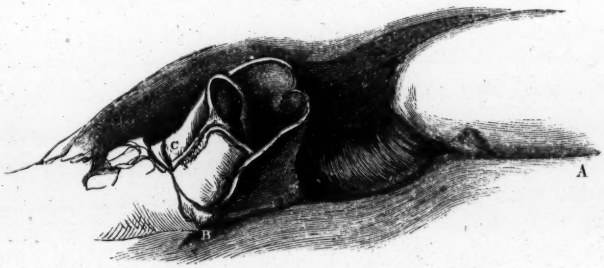
have been passed over almost in silence. Gratiolet* pays but little attention to it; and Dr. Crisp merely notes the similarity

* *L. c.* pp. 307–315. He speaks of the epiglottis being applied to the palate so as effectually to separate the pharynx from the mouth, but does not seem to contemplate the possibility of its being used as I have suggested.

to the same parts in the Porpoise, but gives no description of them. I have drawn the parts in figs. 1 and 2. Fig. 1 represents the back of the tongue with the opening of the larynx, when removed from the mouth and suspended by the tongue; fig. 2, the same parts viewed from the right side.

The root of the tongue is smooth, thick, and very much arched. Between it and the origin of the epiglottis is a space measuring $1\frac{1}{4}''$ in the centre, and $3''$ at the sides, from A to B. This space is con-

Fig. 2.



Tongue, larynx, and trachea of *Hippopotamus*, viewed from the right side. *A*. Root of tongue. *B*. Epiglottis. *C*. Arytenoid cartilages.

cave, with a slight ridge in the middle, and furrows to the right and left leading from the sides of the tongue to those of the epiglottis. Between the epiglottis and the wall of the pharynx this channel is very deep and narrow, but capable apparently of considerable dilatation. The epiglottis and arytenoid cartilages combine together to form an elongated tubular structure that resembles in a very striking manner the arrangement of these parts in the Cetacea, and may, I think, be put occasionally to the same use, namely to advance into and close the posterior nares, so as to preserve a free passage for air to the lungs while the mouth of the animal is under water. The epiglottis is $\frac{3}{4}''$ high in front, with a slight depression in the middle. It wraps round the arytenoid cartilages, which are $\frac{1}{2}''$ high behind. It will be seen from the figures that the right cartilage slightly overlaps the left. The tissue that connects them is extremely loose, so as either to allow of their firmly uniting, or of their separating sufficiently to admit a structure between them, such as the *septum narium*, should they be thrust forward into the nostrils. It will be seen that the arytenoid cartilages are curled upon themselves at their outer border within the laryngeal aperture. I find that the aperture of the posterior nostrils will just admit the structure I have attempted to describe.

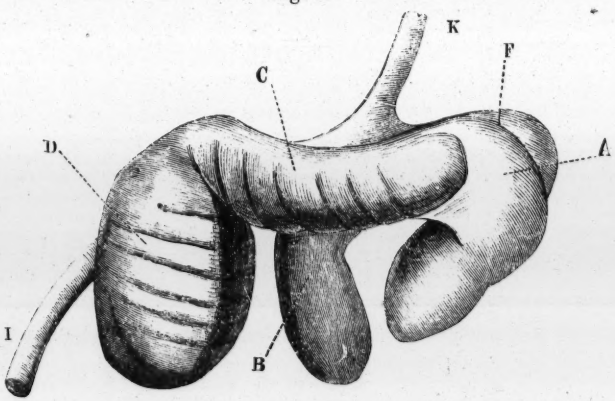
I regret that the animal was so young that the mammæ were scarcely developed, and the mammary gland not at all. It would be interesting to examine whether, in an adult animal, the mammary gland bears any resemblance to that of the Porpoise, where the milk

is collected in a great central reservoir, from which it can be injected into the mouth of the young one while under water.

We now come to the most remarkable viscus in the body—the stomach. This has been described and figured by Daubenton, by Gratiolet, and by Dr. Crisp; but the figures are all so inaccurate as to be nearly useless. I have therefore figured it again in its natural position, after first hardening it in strong spirit. Fig. 3 represents the anterior, fig. 4 the posterior aspect, of one fourth the natural size, and fig. 5 of half the natural size, the interior of the divisions marked A and B. The stomach has been variously described: as a stomach shaped like a colon, with an appendix to the cardiac sac, and a true paunch in front of the sac (Gratiolet); or, as a stomach with three external and four internal divisions (Peters). It seems to me better to describe it at once as a stomach with four divisions, for the separation between the third and fourth portions is most plainly indicated on its external surface, at least in the specimen I am describing. I have distinguished the four divisions by the letters A, B, C, D.

The œsophagus enters immediately above the point of junction of

Fig. 3.

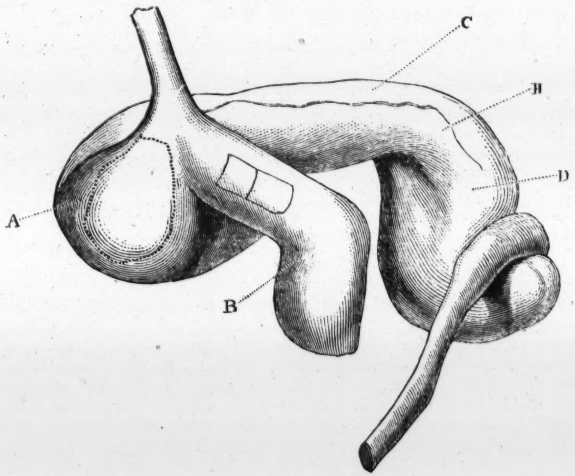


Anterior aspect of the stomach of *Hippopotamus*, one-fourth natural size. *A, B, C, D.* The four divisions in order. *F.* Partition in the interior of division *A*. *K.* Œsophagus. *I.* Duodenum.

the divisions A and B. The arrangement of these parts will be better understood by reference to fig. 5. A piece of the wall of the cardiac end has been removed, as shown by the dotted line in fig. 4; and the view is taken right along the central portion of the stomach, from left to right of the animal. The longitudinal folds of the lining membrane of the œsophagus converge and meet upon the edge of a

valve (marked E), which extends along the posterior side of the division A till it meets the partition dividing this portion of the stomach from that which succeeds (C). From the point where these folds touch the edge of the valve a second set are given off, which seem to conduct the food into the division C. There is a second valve, or rather partition, as seen in the figure, extending down the whole length of this sac almost to its apex, and dividing it nearly equally. Its course may be traced externally by a depression on the outside of the stomach, from the point F along the dark line which curves round the cardiac end in fig. 3. The partition between A and C is designated by the letter G.

Fig. 4.



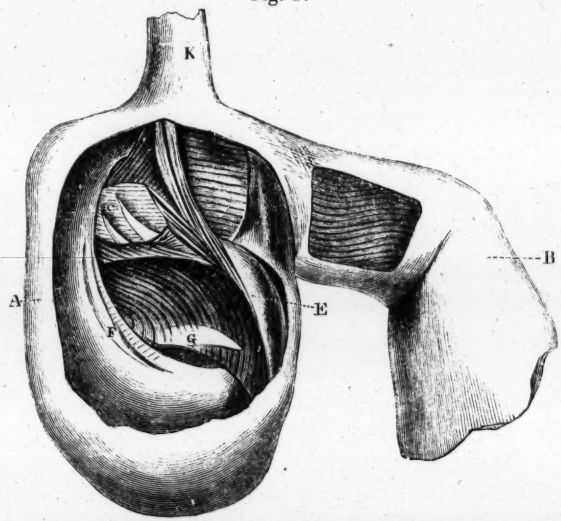
Posterior aspect of the same parts, of the same size.
A, B, C, D. The four divisions in order. *H.* Passage between divisions *C* and *D*. The dotted lines on divisions *A* and *B*. indicate the extent of the aperture cut in their walls to show their internal structure.

The division B is not subdivided by valves of any kind. Its walls are thick; nearly $\frac{1}{8}''$, and the villi are very large and coarse, disposed along lines which take the direction shown in fig. 5.

The passage from A to C is narrowed by a partition (G) to $\frac{1}{2}''$ in height. The compartment C is crossed obliquely by eight transverse partitions extending round the lower half of its diameter. The number of these varies: Gratiolet's specimen had nine, Dr. Crisp's seven. Of these, six only are visible on the exterior. The first is attached to the partition dividing this portion from A; and the last is very small, and within the passage leading to D. They are of no great

height: the highest measures barely $\frac{1}{2}''$, and the lowest $\frac{1}{8}''$. This portion has a nearly uniform diameter of $3''$.

Fig. 5.



Internal view of the first and second divisions of the stomach of *Hippopotamus*, half natural size.

A, *B*. First and second divisions, viewed from the left side. *C*. Interior of third division. *G*. Partition between divisions *A* and *C*. *F*. Partition in the interior of division *A*. *E*. Valve along the posterior side of the same.

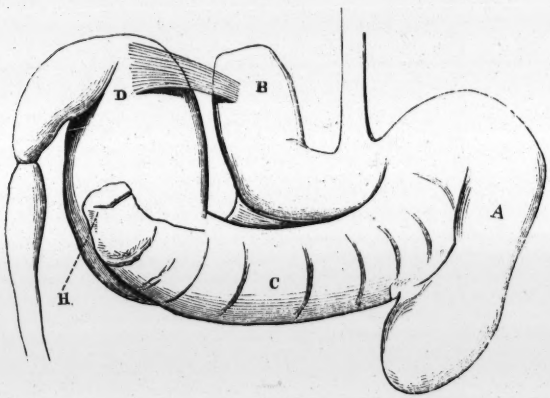
Between the divisions C and D there is a passage, the floor of which measures $2\frac{1}{2}''$ along its anterior edge, $1\frac{1}{2}''$ along its posterior, and is $1''$ high in the centre. It is marked H on fig. 4, where its course may be seen to extend over the commencement of the last division. This is crossed by nine crescentic transverse bands along its anterior surface, as shown in fig. 3. One only, the third in descending order, is of any extent; it measures $3''$ from side to side, and $1''$ in depth at its deepest part. Six only of these are visible on the exterior. The pyloric aperture is marked by an annular constriction $\frac{1}{2}''$ in diameter. Immediately beyond the pylorus the intestine is much dilated for a distance of about $3''$ (fig. 4).

A microscopic examination of the coats of the different stomachs (kindly undertaken for me by my friend N. H. Martin, Esq., of Christ's College) shows that the villi are of nearly the same shape throughout the first three divisions, being short cylindrical projections, varying somewhat in size and distribution in the different

parts. They are very small and few in number in A; and there are no peptic glands among them. There are no villi upon the large valve in A. In B they are largest and most numerous, interspersed with here and there a few mucous glands. In C they are numerous, disposed in lines that cross the divisions obliquely, but they are not large. In D there are no villi, but tubular peptic glands, like those ordinarily found in that portion of a stomach which secretes the gastric fluid, as in the "abomasus" of a Ruminant.

I have been describing the stomach according to my own specimen; but when I came to examine that of the male that died in the Gardens last year, and which is now preserved in the Museum of the Royal College of Surgeons, I found the most remarkable difference of arrangement. Professor Flower has most kindly allowed me to make a sketch of it (fig. 6), which will explain my meaning at a

Fig. 6.



Stomach of *Hippopotamus*, drawn from the specimen in the Museum of the Royal College of Surgeons.
The letters denote the same parts as in figures 4 and 5.

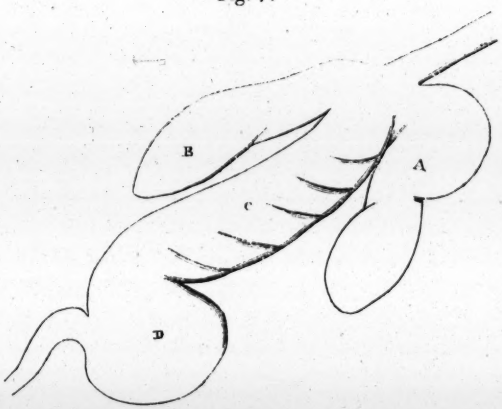
glance. It will be seen that the divisions B and D, instead of being directed downwards, are directed upwards; the passage at the point H is on the under instead of on the upper border; and at the pylorus there is a crescentic valve succeeded by a wide portion of intestine, which presently becomes thickened and contracted, suddenly instead of gradually. An arrangement such as this would seem to be implied by Peters's phrase, "a stomach with three divisions externally and four internally," which he observed in an adult. The arrangement indicated in Gratiolet's figure, which I have reproduced (fig. 7), is intermediate between the two. Division B is not bent upon itself at all, but lies parallel to C; while D is more globular in shape, and

underlies a portion of C. Daubenton's specimen (so far as one can understand his figure at all) resembled mine, except that the last division was much smaller in proportion.

Daubenton makes no mention of the crescentic folds in D; neither does Dr. Crisp. Disappearance with age might account for Dr. Crisp not finding them; but Daubenton's specimen was fœtal.

I am unable to offer any reason for this very strange alteration of arrangement. I can only state what I have observed.

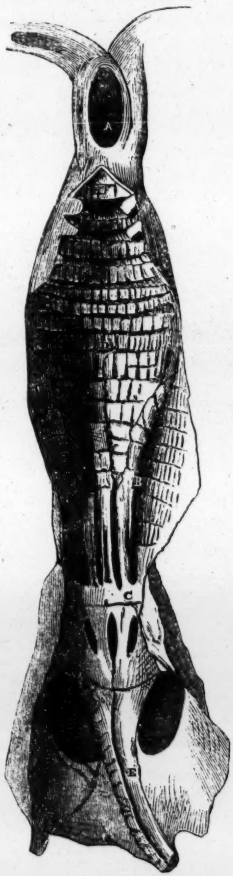
Fig. 7.



Stomach of *Hippopotamus*, after Gratiolet, 'Recherches sur l'Anatomie de l'Hippopotame,' pl. ix. fig. 4.
The letters denote the same parts as in the preceding figures.

Intestines.—They measured 49 feet from the pylorus to the anus. On opening the abdomen the small intestines were alone visible. The colon lay beneath them, and was not disposed in spiral folds as it is in some Pachyderms. The small intestines are thickly beset with very fine silky villi, $\frac{1}{8}''$ long. There is no cæcum, and no marked division into small and large intestine; but at about 3′ 6″ from the anus the villi suddenly cease, and the tube dilates considerably. At this part, for about 4″ in length, the mucous membrane is puckered into longitudinal folds, which are occasionally crossed by other folds transversely, so as to enclose a number of spaces of irregular size and shape. The floor of these spaces is again subdivided in a similar manner by fresh reduplications of the membrane, producing hollows of the most varied form (some large and some small), so as to give in places, where the size does not exceed that of a small pin's head, an appearance not unlike the orifices of glands. The whole arrangement may, to a certain extent, be compared to the reticulations of the membrane of the intestines of certain

Fig. 8.



Uterus of *Hippopotamus amphibius*.
A. Uterus. *D*. Vagina. *B*, *C*. Lower portion of ditto. *E*. Clitoris.

fishes, as the Sturgeon and the Frogfish. Dr. Crisp* describes and figures this part, and calls it the "colic gland;" but we could not

* *L. c.* p. 604. Comp. Gratiolet, p. 395, who speaks of "un espace couvert de petits plis entrecroisés qui lui donnent un aspect aréolaire."

discover any glands, after a very minute and careful dissection. The coats of the large intestine are very much thicker than those of the small, and the mesentery is much stouter and stronger. In this specimen it was heavily weighted with fat.

I regret that I omitted to examine the *pancreas*. The *spleen* is flat and elongated, rather broader at one end than at the other, and partially divided into two lobes. It measured $5\frac{1}{2}''$ in length, and $4''$ in breadth at its widest part. The *liver* has been described and figured by Gratiolet.

Uterus.—Fig. 8 (p. 194) represents this organ laid open. Gratiolet remarks (p. 401), "The uterus has two flexuous, intestiniform horns, opening by a broad orifice into a common cavity of moderate extent, which almost immediately, without the interposition of any distinctly marked neck, becomes the vagina. This vagina presents first a tract covered with circular bands like *valvulæ conniventes*. More than twenty-five of these bands can be counted. Next comes a space covered with longitudinal folds, terminating in a *cul de sac* near the urogenital chamber, without any aperture. Is this imperforation of the vagina constant in female Hippopotami of this age?"

The uterus of my specimen differs in several particulars from that the description of which I have just given. The body of the uterus (A, fig. 8) is very small. There is no proper "os tincæ." The septum between the confluent horns terminates about $\frac{1}{4}''$ in front of the constriction that takes its place. The superior portion of the vagina (that above the point where the longitudinal folds terminate) is marked by thirteen transverse muscular bands, subdivided longitudinally by striations of greater or less depth. These are shallower and more numerous between the bands than on their surface. The bands themselves are thickest at the superior end, where they alternate; that is to say, each band extends only halfway across the vagina, its termination gradually dying into the walls. Possibly these, from their great size and thickness, may perform the functions of an "os." The lower portion from B to C, $2\frac{1}{2}''$ in length, is marked by two prominent diverging rugæ, between and to the sides of which the muscular bands before described are continued, but they are much less definite and distinct. The vagina was perforate; the aperture was small, but admitted a slender probe without difficulty. In front of this aperture are three deep depressions. The central one contains the orifice of the urethra. Those on each side appear to be merely continuations of the deep folds of membrane above. The walls at this part are exceedingly thick, nearly half an inch in breadth. The central portion and front wall of what may be termed the "cloaca" is occupied by the clitoris, the superior surface of which is marked by a deep groove, continuous with the opening of the urethra. On each side of this, above the opening of the rectum, is a deep pit or pouch, $1''$ long, by $\frac{1}{2}''$ wide and $\frac{1}{2}''$ deep.

2. Contributions to a General History of the *Spongiadæ*. By J. S. Bowerbank, LL.D., F.R.S., &c. &c.—Part II.

[Received January 23, 1872.]

(Plates X. & XI.)

Geodia M'Andrewii, Bowerbank. (Plate X.)

Sponge massive, sessile; surface even, thickly pitted, hirsute with large and long fusiformi-acerate external defensive spicula, prominently projected; and at the surface with long fusiformi-spiculated porrecto-ternate, and very large attenuato-porrecto-furcated ternate external defensive spicula, slightly projected. Dermis furnished profusely beneath the dermal membrane with minute subspinous cylindro-stellate spicula. Dermal membrane thin and translucent, spiculous; spicula fusiformi-acerate, minute and slender. Connecting spicula attenuato-patento-ternate, very large, and occasionally with the radii furcated; and also attenuato-recurvo-ternate spicula, long and slender, few in number. Oscula small, congregated in an extensive superficial area. Pores congregated in numerous small depressions or pits, furnished with small radiating fasciculi of fusiformi-acerate tension-spicula, and with numerous minute subspinous cylindro-stellate retentive spicula. Skeleton-spicula fusiformi-acerate, very large and long. Interstitial membranes—tension-spicula fusiformi-acerate, small and variable in size; retentive spicula subspinous, cylindro-stellate, very minute. Ovaria subglobose, large, depressed.

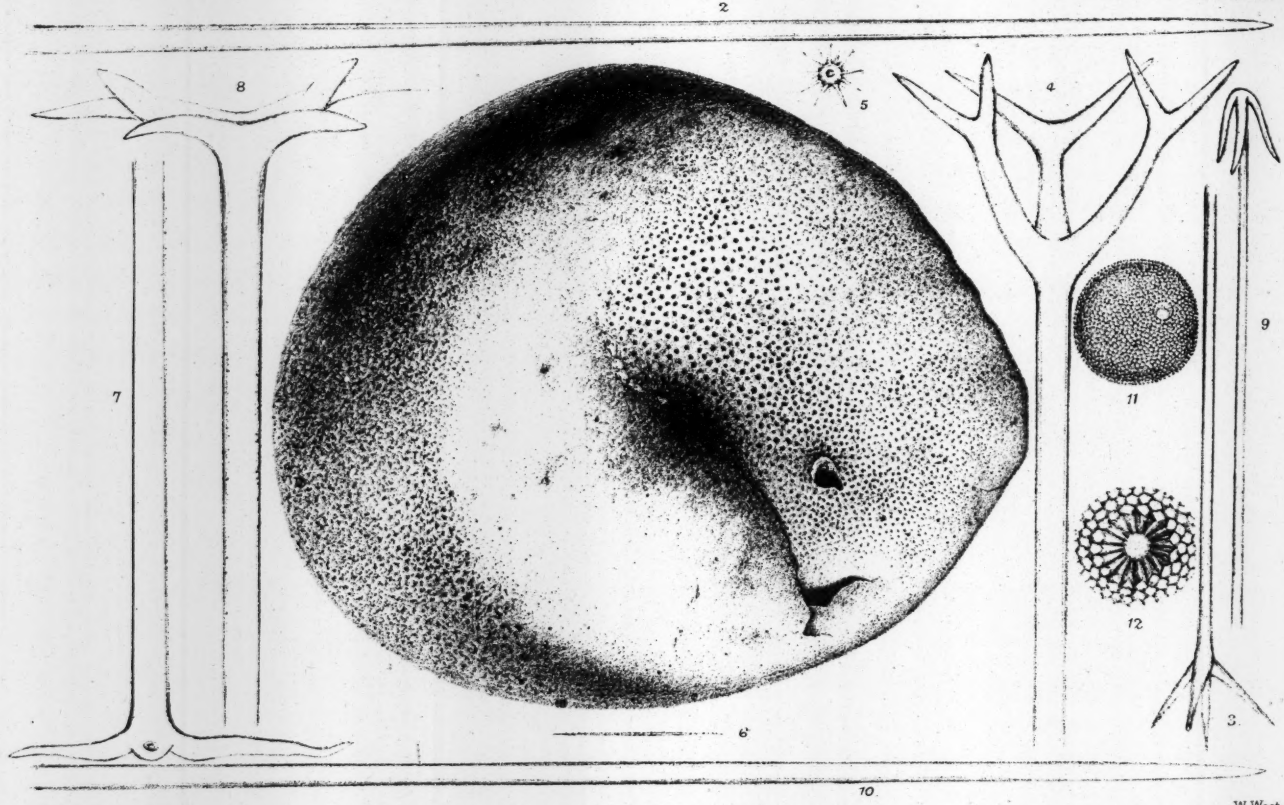
Hab. South side of Vigten Island, Norway, 100 fathoms (*Robert M'Andrew, Esq.*).

Colour. Deep cream-yellow.

Examined in the dried state.

This remarkably fine species was brought up by the dredge of my friend Mr. M'Andrew, from 100 fathoms depth, at the south side of Vigten Island, Norway. In its dried condition it is 10½ inches in length by 9 in width and 5½ inches in height, and has the form of an irregular hemisphere. One end of the mass is depressed into nearly a circular plane, extending from the base line to near the top of the sponge; and the middle of this plane for 5 inches in diameter is occupied by small oscula, rarely attaining a line in diameter, but exceedingly numerous. My late friend Mr. Lucas Barrett, who accompanied Mr. M'Andrew, says that when fresh from the sea it was nearly 18 inches in diameter at the base, and "that the whole of the surface, excepting that part occupied by the oscula, was furnished with long bristle-like spicula, very numerous and as close together as the hairs on a man's head, and that it was extremely heavy and fleshy in its texture." Notwithstanding the partial drying it had undergone during its voyage home, the interior when I received it had much the consistence of indurated liver. I think the specimen comprises nearly the whole of the sponge, and that

P.Z.S. 1872. Plate X.

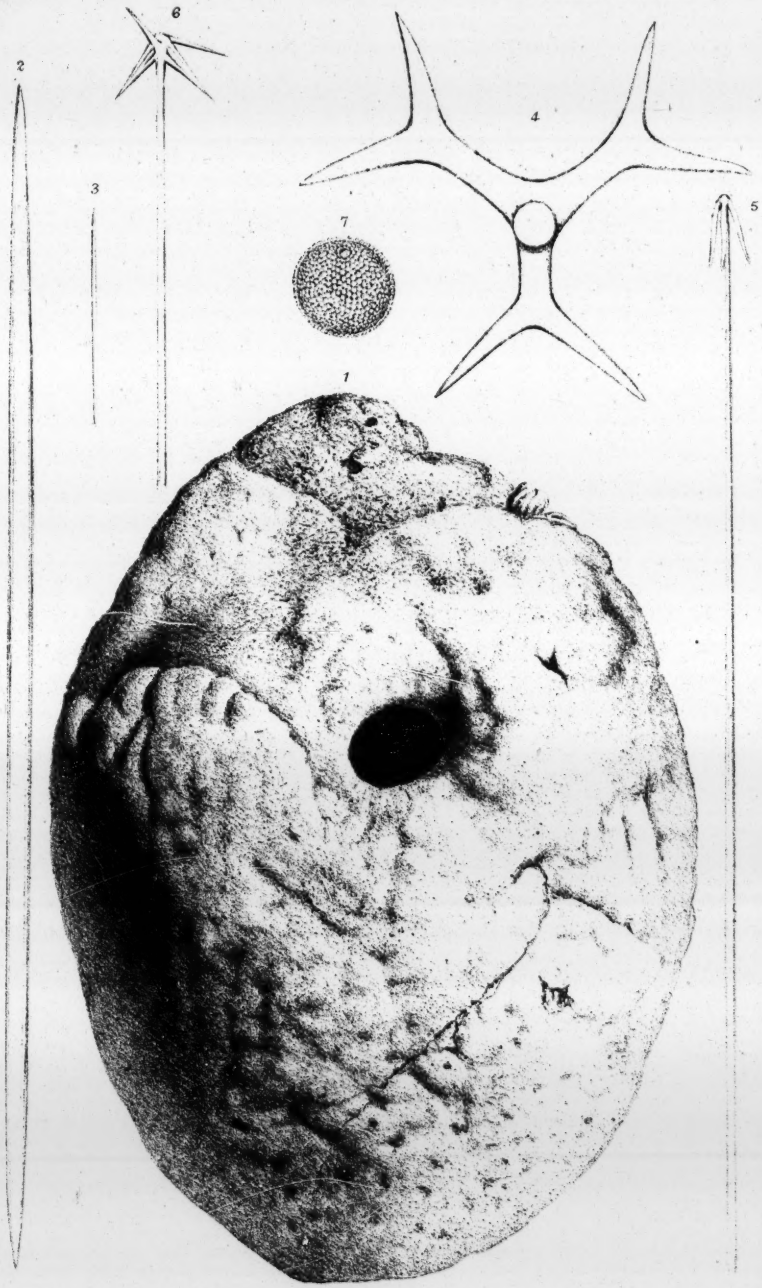


Del et lith. W. Lens Alcoua

Geodia Mc Andrewii.

W. West & Co imp.

BRITISH
2800c73
MUSEUM



Del.et lith.W.Lens Aldous

W.West & Co. imp

Geodia Barretti.

BRITISH MUSEUM
2806.73

the natural base was as extended as the present mutilated one, as the basal fasciculi of the skeleton run uninterruptedly from the centre to the circumference of the present base. Unfortunately the whole of the long surface-spicula were rubbed off during its carriage from Liverpool; but as I carefully preserved all the spicula that I found in the paper in which it was packed, I fully satisfied myself of their structure, and that they were truly from the sponge in question. Beside the large fusiformi-spiculated porrecto-ternate spicula, there are numerous small fusiformi-acerate ones, which connect the dermal membrane with the stratum of ovaries beneath it; but they appear, even in the dried specimen, scarcely to project their apices through the membrane, excepting in the neighbourhood of the pores, around which they project in small radiating fasciculi for a fourth or a third of their length, apparently as organs of defence to those orifices, which are congregated in little pits or depressions, and which give a striking character to the surface of the dried specimen.

The pores vary in form from round to oval, and in diameter from $\frac{1}{481}$ inch to $\frac{1}{231}$ inch; and beneath each group of pores there was an intermarginal cavity, the diameter of the diaphragm at the base of which varied from $\frac{1}{107}$ inch to $\frac{1}{75}$ inch.

The structure of the large fusiform-spiculated porrecto-ternate spicula is new and interesting; the shaft of the spiculum is continued in a straight line, and terminates acutely and at about the length of one of the radii; beneath its apex three radii are given off at equal distances from each other, slightly curving towards the distal points in the direction of about an angle of 45 degrees. The furcated porrecto-ternate spicula are larger and stronger than the porrecto-ternate ones; and the angle at which they curve upwards from the shaft is from about 50 to 60 degrees. The oscula are extremely numerous; although they occupy an area of about 5 inches in diameter they are rarely as much as the eighth of an inch apart: the orifice is level with the surface-plane, and is surrounded by a thin marginal membrane; and the entrance for about the length of its own diameter is cylindrical and perfectly open, but at that point there is situated a stout veil or diaphragm. In some cases this was more or less open; but in the greater number it was firmly and completely closed, the membrane exhibiting numerous concentric rugæ, at the middle of which there was a strong pursing of the tissue. This opaque spot was not always in the centre of the membrane; but it always formed the centre of the concentric lines of rugæ. The lining membrane of the entrance to the osculum was smooth and tense, and exhibited a series of lines at right angles to the long axis of the osculum, indicating the presence of fibrous tissue. On examining the veils or diaphragms at the inner surface they appeared at least twice the diameter of the inner orifice of the osculum, which bevelled slightly inward, like a very shallow funnel, to the outer margin of which the extreme edge of the diaphragm was firmly attached, thus readily allowing of an opening of the membrane to the full extent at least of the diameter of the cylindrical outer tube of the osculum. The interstitial membranes were singularly crowded

with extraneous matter—Polycystina? Foraminifera, grains of sand, and the spicula of other sponges were abundant amidst the proper fusiformi-acerate spicula of the membranes; and the cylindro-stellate spicula of the sarcode were very abundant. The ovaries are very large and have the form of a depressed sphere, very closely resembling an orange in shape, the foramen being situated in the position that the attachment to the stalk would be in the orange. An average-sized one measured $\frac{1}{100}$ inch in diameter, while a full-sized one of *G. Barretti* measured only $\frac{1}{333}$ inch in diameter. The skeleton-spicula are very large, frequently a quarter of an inch in length.

I cannot better name this fine species of *Geodia* than by dedicating it to my friend Mr. M'Andrew, to whose spirited and constant exertions to extend our knowledge of marine natural history the scientific world are deeply indebted, and whose kindness and liberality has been extended to every one who has the pleasure of knowing him and who are engaged in pursuits similar to his own.

GEODIA BARRETTI, Bowerbank. (Plate XI.)

Sponge massive, sessile; surface even, both strongly and minutely hirsute, with more or less of large fusiformi-acerate spicula, and universally with small fusiformi-acerate spicula projecting at right angles from one sixth to one eighth of their length; and profusely, beneath the dermal membrane, with minute cylindro-stellate spicula. Dermal membrane thin, translucent, aspiculous. Connecting spicula attenuato-furcated patento-ternate, stout; and attenuato-recurvo-ternate, long and slender. Oscula congregated in deeply depressed areas, veiled, numerous and small. Pores inconspicuous, minute, dispersed. Skeleton-spicula fusiformi-acerate, large. Interstitial membranes—tension-spicula fusiformi-acerate, small, variable in size, abundant; retentive spicula cylindro-stellate, minute. Ovaria much depressed.

Hab. South side of Vigten Island, Norway, 100 fathoms (*Robert M'Andrew, Esq.*).

Colour. Deep cream-yellow.

Examined in the fresh state.

I am indebted to my kind friend Mr. M'Andrew for three fine specimens of this species. One is of a semilunate form, $8\frac{1}{2}$ inches in length, 5 inches in breadth, and 2 inches in depth, and it is evidently only a portion of a much larger specimen. The second one is of a somewhat oval form, $5\frac{1}{2}$ inches in length, 4 inches in breadth, and $3\frac{1}{2}$ inches in height, and is the one figured. The third one is $5\frac{1}{2}$ inches high, $4\frac{1}{2}$ inches broad, and 2 inches thick, and is very unlike in form to the first two specimens. The surface is very much more undulating, and it is only in some of the depressed portions of this specimen that we have any indication of the large spicula which render those parts of the surface so extraordinarily villous. In these spots the spicula, which exceed the eighth of an inch in length, are so abundant that they completely cover and obscure the surface of the sponge, from which they project nearly the whole of their length,

the proximal ends of many of them scarcely passing through the dermal crust of the sponge. On the more exposed parts of the sponge only a very few were to be found; and, what is very remarkable, some of the deepest and most protected depressions were equally destitute of them.

In the first specimen, when the two parts into which it was divided were put together, there were the remains of two very large depressed areas, and one smaller but perfect one; the latter was nearly circular, with gradually rounded edge, and at the level of the outer surface was $1\frac{1}{2}$ inch in diameter, and $\frac{3}{4}$ inch deep. The bottom of this area was crowded with small oscula, none of which exceeded half a line in diameter. Remains of the same cribriform arrangement of the oscula was apparent in the portions of the larger areas; and in these some of the oscula were as much as a line in diameter. In the second specimen there is but one, large, nearly circular, depressed area, which decreased in size from 1 inch at the surface-level to $\frac{5}{8}$ inch at its smallest diameter; half an inch within the level of the surface it expanded into a great oval cavity 2 inches deep from the surface-level; and the whole of the interior, from immediately within the level of the greatest contraction of the orifice, was lined with closely packed oscula, presenting the same cribriform arrangement as in the specimen first described. Nearly all of the oscula in both specimens were closed by a stout membranous veil. When a portion of these oscula were immersed in water and examined by transmitted light with a power of 260 linear the membranous veils were seen to be depressed below the level of the surrounding margin, faint concentric lines or ridges were apparent, and a thickening and pursing of the membrane near the middle of the area was visible. From the marginal ring of the oscula numerous small fusiformi-acerate dermal spicula were projected for about a fourth or a third of their length; and deeper within the margin a few were projected for at least three fourths of their length: this projection of spicula is apparently to prevent the intrusion of vermes or other predaceous animals; and both by structure and position they are admirably adapted for such a purpose.

The depressions immediately above the intermarginal cavities, which appear like pores in the dried specimen, are barely visible with an inch lens; and in a portion of the first specimen described, which was preserved in salt and water immediately on being taken from the sea, they were not in the slightest degree visible with the same power.

The dermal membrane covers the external expanded orifices of the intermarginal cavities. It is perforated by numerous minute pores equally dispersed over the surface, and which apparently have the power of opening or closing at the will of the animal. When a portion of the crustular dermis was cleared from the connecting spicula, so as to expose both the outer and inner surfaces to view, and then mounted in Canada balsam, many of the pores were found in an open condition; but in the specimen preserved in salt and water none could be detected in that state.

The orifices to the open pores in the dermal membrane varied in diameter from $\frac{1}{545}$ inch to $\frac{1}{1250}$ inch. Immediately beneath the dermal membrane there is a stratum of sarcode filled with minute cylindro-stellate spicula. This stratum forms about two fifths of the entire thickness of the dermal crust, which is connected with the mass of gemmules beneath by the fusiformi-acerate spicula of the dermal crust. The distal points of these spicula pass through the dermal membrane, while their proximal ones are embedded in the outer surface of the ovarian stratum, which forms about three fifths of the entire thickness of the crust.

The stratum of sarcode filled with minute cylindro-stellate spicula appears to perform a very important part in the economy of the animal. It is traversed by minute canals at various angles, each canal being connected at one end with a pore, and terminating at the other in the expanded distal extremity of an intermarginal cavity. The cylindo-stellate spicula, strengthening and supporting the sarcode stratum, are exceedingly minute; they vary in their extreme diameter from $\frac{1}{3000}$ to $\frac{1}{6666}$ inch. The length of the fusiformi-acerate spicula is $\frac{1}{61}$ inch.

The arrangement of the ternate connecting spicula at the inner surface of the crustular coat is exceedingly interesting: they occur in a series of bundles; the long attenuated shafts of each fasciculus approximate at their bases and diverge thence until the ternate head of each is about equally distant from its surrounding neighbours; and the extremities of the rays touch or slightly cross each other, thus forming a beautiful regular angular network, the meshes being six or seven-sided according to circumstances. The upper surfaces of the radii are firmly attached to, or partially embedded in, the under surface of the crustular stratum. Within each of these areas there is usually to be seen the proximal end of one of the intermarginal cavities.

The intermarginal cavities exhibit a high degree of organization; they are in form not unlike a bell, the proximal end being at the inner surface of the crustular dermis, and the distal one at the inner surface of the stratum of sarcode and stellate spicula immediately beneath the dermal membrane, and towards which it gradually increases in its diameter; the proximal end of one measured $\frac{1}{23}$ inch in diameter, and the distal end $\frac{1}{144}$ inch. These cavities are lined throughout their length with a stout transparent membrane; and at the proximal end of each cavity there is a strong membranous diaphragm, which in the greater number of cases was in a closed state; in this condition the membrane was filled with concentric circles composed of minute rugæ or thickened lines, and at the centre was closely pursed together, completely closing the orifice. In some the membrane was only partially closed, and the orifice was either circular or slightly oval; and in two instances in the same field of view the orifices were nearly as large as the basal opening of the bell-shaped cavity, and the central margin of each diaphragm at its proximal end was dense, highly coloured, and much thicker than at the other parts of the membranes. The pursing of the membrane

of the diaphragm was always outward, so that when viewed from within it presented a slightly funnel-shaped depression, the bottom of which was conical.

A section at right angles to its surface of one of the diaphragms mounted in Canada balsam measured $\frac{1}{1276}$ of an inch in thickness, being at least eight or ten times that of the lining membrane of the cavity. The recurvo-ternate spicula always accompany the expando-ternate ones; but their grapnel-like heads rarely appear to reach the inner surface of the dermal crust, and I did not observe in any case that their heads were immersed in the stratum of gemmules. The recurved radii of these spicula are remarkably long. Occasionally, but very rarely, a porrecto-ternate spiculum was found among the recurvo-ternate ones.

The skeleton-spicula are large and stout; they were collected in large and continuous fasciculi running from the basal centre to the surface of the sponge, where they unite with the attenuated shafts of the connecting spicula. The cylindro-stellate spicula of the sarcode of the interstitial membranes are in great abundance; they are precisely the same in form and size as those immediately beneath the dermal membrane. The gemmules, or ovaria, in the dermal crust are mostly in an exhausted or solid state; occasionally on the outer surface of the stratum there are a few in a prolific condition. They are also abundantly dispersed over the interstitial membranes of the interior, and in that part of the sponge the greater number of prolific ones are to be found. They may be there seen in all degrees of development; the young and imperfectly developed ones appear always to be surrounded by a proper membrane, within which they are embedded in a mass of pulpy or sarcodous matter. Considering the foramen to be the top of the gemmule, their form is that of a sphere considerably depressed, so that viewed in profile they present quite an oval form. The diameter of an adult one measured was $\frac{1}{333}$ inch.

The anatomy of this remarkable species exhibits an amount of elaborate structural peculiarities that could scarcely be imagined to exist in a creature hitherto considered to be among the lowest in the scale of created beings.

DESCRIPTION OF THE PLATES.

Plate X.

Geodia M'Andrewii, Bowerbank.

Fig. 1. Represents the type specimen, half the natural size, in its present dried condition.

Fig. 2. About half of one of the large fusiformi-acerate defensive spicula, magnified 80 linear.

Fig. 3. A spiculated porrecto-ternate external defensive spiculum, magnified 80 linear.

Fig. 4. One of the large attenuated porrecto-furcated ternate external defensive spicula, magnified 80 linear.

Fig. 5. A minute subspinous cylindro-stellate spiculum from the dermal membrane of one of the porous areas, magnified 530 linear.

Fig. 6. One of the small fusiformi-acerate tension-spicula from the dermal membrane of one of the porous areas, magnified 80 linear.
Fig. 7. A large attenuato-patento-ternate connecting spiculum, magnified 80 linear.
Fig. 8. A furcated attenuato-patento-ternate connecting spiculum, magnified 80 linear.
Fig. 9. One of the recurvo-ternate spicula from immediately beneath the external crust of the sponge, magnified 80 linear.
Fig. 10. About half of one of the large fusiformi-acerate skeleton-spicula, magnified 80 linear.
Fig. 11. An ovary from the external surface of the sponge, magnified 108 linear.
Fig. 12. The foramen of one of the ovaries, showing the funnel-shaped disposition of the spicula, magnified 308 linear.

For further illustration of the structure of the ovaries of this sponge I must refer the reader to the 'Philosophical Transactions of the Royal Society' for 1862, pl. xxxiv. figs. 2, 3, 4, 5, 6:—Fig. 2 representing an ovarium in very nearly an adult state, magnified 183 linear. Fig. 3. A small portion of the surface of an adult ovarium, exhibiting the foramen, magnified 308 linear. Fig. 4. A portion of a young ovarium with the distal points of its spicula acutely terminated, not being fully developed, magnified 308 linear. Fig. 5. A section through nearly the centre of a mature ovarium, showing the radiation of its spicula from near the centre to its circumference, magnified 308 linear. Fig 6. Two ovaria, (*a*) containing about the maximum of ova, (*b*) after a great part of the ova have been discharged, magnified 108 linear.

Figures similar to those referred to in the 'Philosophical Transactions' may also be seen in 'Monograph of British Spongiadæ,' vol. i. figs. 325-329.

Plate XI.

Geodia Barretti, Bowerbank.

Fig. 1. Represents the type specimen of the species, natural size.
Fig. 2. One of the large fusiformi-acerate spicula, representing both the large external defensive and the skeleton-spicula, magnified 80 linear.
Fig. 3. One of the small fusiformi-acerate spicula which form the secondary system of external defensive spicula, magnified 80 linear. These spicula are identical with the tension-spicula of the interstitial membranes, the same figure serving to represent both.
Fig. 4. The head of one of the large attenuato-furcated patento-ternate connecting spicula, abundant immediately beneath the dermal crust of the sponge, magnified 80 linear. The shafts of these spicula are rather stouter and nearly twice the length of the skeleton ones; they are frequently one sixth or one fifth of an inch in length.
Fig. 5. An attenuato-recurvo-ternate spiculum of the normal form, magnified 80 linear. The heads of these spicula are subject to frequent distortions.
Fig. 6. Represents one of the most singular of the numerous distortions of the heads of the recurvo-ternate spicula, the radii in which are double the usual number, magnified 80 linear. By an oversight of the artist, a figure of the minute cylindro-stellate retentive spicula of the dermal and interstitial membranes has been omitted; but a reference to those of *G. M'Andrewii* will afford an accurate idea of their form.
Fig. 7. One of the ovaria, magnified 250 linear.

For further information regarding the anatomy of this sponge I must refer the reader to the 'Philosophical Transactions of the Royal Society' for 1862—pl. xxxii. fig. 2, for a section of the sponge at right angles to its surface; fig. 3 for a view of a small portion of the dermal crust; and fig. 4 for a group of the inhalant pores. Similar figures will also be found in 'Monograph of British Spongiadæ,' figs. 354, 301, and 302.

BRITISH MUSEUM 2800 73



J. G. Keulemans lith. Mintern Bros. imp.

MACACUS BRUNNEUS.

3. On *Felis pardinoides*, J. E. Gray.

By D. G. Elliot, F.L.S., F.Z.S., &c.

[Received February 20, 1872.]

In the 'Proceedings' of this Society for 1867, p. 400, Dr. Gray has described a Cat as *Felis pardinoides*, giving as its habitat India. The typical specimen is evidently not an adult animal; and from its resemblance to *F. geoffroyi*, I felt certain, while examining it, that its habitat was not correctly given. During my late visit to Leyden I found another specimen of a Cat, almost precisely similar to Dr. Gray's type, marked as *F. geoffroyi*, and stated to have been brought from Patagonia, the native country of that species. This Leyden specimen (which is also that of a young animal) by the kindness of Prof. Schlegel I have been enabled to remove to London, and thus to identify with the so-called *F. pardinoides*. The young *F. geoffroyi* appears to differ from the adult in the larger size and somewhat different arrangement of the spots, those upon the sides, shoulder, and rump being, as Dr. Gray describes them, "varied with grey hairs in the centre, making them appear somewhat as if they were formed of a ring of smaller black spots." But the general colour of the animal, with its lengthened annulated tail, is precisely that of typical *F. geoffroyi*.

Dr. Sclater has already shown that the *Pardalina warwickii*, Gray, is also *F. geoffroyi* (P. Z. S. 1870). The synonymy of this species will therefore be somewhat as follows:—

Felis geoffroyi.

Felis geoffroyi, D'Orb. Voy. Am. Mérid. t. 13; Gray, P. Z. S. 1867, pp. 272, 400; Gray, Cat. Carn. Mamm. 1869, p. 23; Sclat. P. Z. S. 1870, p. 796.

Leopardus himalayanus, Gray, Cat. Mamm. Brit. Mus. 1842, p. 44.

Pardalina warwicki, Gray, P. Z. S. 1867, p. 267, pl. 24; *id.* Cat. Carn. Mamm. 1869, p. 14.

Felis pardinoides, Gray, P. Z. S. 1867, p. 400; *id.* Cat. Carn. Mamm. 1869, p. 27. sp. 23.

Hab. South America, Patagonia.

4. Further Remarks on the External Characters and Anatomy of *Macacus brunneus*. By John Anderson, M.D., Calcutta.

[Received February 6, 1872.]

(Plate XII.*)

Very shortly after I had received the specimen of the Monkey from

* This figure has been prepared by Mr. Keulemans from the living specimens of *Macacus brunneus* received since Dr. Anderson's paper was read. After examining them I have come to the conclusion that this species is not different from *M. arctoides*, Is. Geoffr. Mag. de Zool. 1833, Mamm. pl. 11.—P. L. S.

Bhamô in Upper Burmah from which my original description of this species was taken, I learned through Mr. Oscar Fraser that a tame Monkey had arrived in Calcutta from the hilly region of Cachar. I had the good fortune to secure the specimen for this Society, and to recognize in it the same species as the Bhamô Monkey, from which it only differs in being a little lighter-coloured. Strange to say, this Cachar specimen had not been long in my possession when Lieut. Bourne, whose attention I had called to the subject of Cachar Monkeys, and to whom I had indicated the probability that the Bhamô species might extend as far west as the hilly region of Sylhet and Cachar, sent me a young female with an unclosed fontanelle, which I have also forwarded to you by Mr. Jamrach, who very kindly undertook the care of the two specimens. Mr. Jamrach has also taken with him to London another young female, also from Cachar.

Since my first acquaintance with this Monkey, I have been informed by Mr. Rutledge, the extensive dealer of animals in the city, and who procured Mr. Jamrach's female, that two or three specimens of the species have been sold by him in India without his having recognized them as distinct from *Macacus rhesus*.

All the specimens I have sent you are young; but the person from whom Mr. Fraser procured the second specimen states that the adult is a large Monkey, coloured like the male I have forwarded to London, and that it is not common in Cachar.

As I have already stated in my previous note on this species, I first met with it in the Kakhyen hills to the east of Bhamô, and sent the specimen down to Bhamô to await my return from Western Yunan. On arrival at that town, I learned to my regret that the animal had been beaten to death and buried; but when the second specimen from Bhamô reached me at Calcutta, I almost disbelieved the tale of its death, and thought I recognized my old in my new acquaintance. But the death of the latter has dissipated that supposition, an examination of its teeth and the condition of its skeleton rendering it highly improbable that such was the case; for three years and a half have elapsed since I met with the first specimen, and the second is so young that it has only its milk-teeth—an unlikely circumstance if they had been one and the same individual.

Another Monkey, which appears to be closely allied to so-called *M. brunneus*, accompanies the specimens I have sent you. It is the property of Mr. Jamrach; and all that I have been able to learn of its history is that it was purchased at Singapore. It has the red face, short body, and the rudimentary tail of *M. brunneus*; but, instead of having a brown, it has a bright rufous coat and faintly annulated hair. A young female, evidently the young of this species, has been received in Calcutta from Singapore since Mr. Jamrach's departure, and it only differs from the male in having its rufous fur more or less washed with brownish. If it is not *M. speciosus* from Japan, I know of no other known species to which to refer it; I would indicate it as *M. rufescens* if it prove to be new.

In my first note I was under the impression that my second Bhamô specimen was at least adolescent, if not adult; for it had all the habits

of the latter; but, as I have already indicated, I was wrong in thinking so, and I was really dealing with a young Monkey.

The skull is very thick, the frontal bone, about half an inch above the superciliary margin, measuring 3 lines in thickness. The suture between the frontal and malar bones has entirely disappeared; and that between the squamous and parietal on one side is partially obliterated in its latter third. The lambdoidal, sagittal, and fronto-parietal sutures are intact; but the fontanelle is completely closed.

The principal features of this young skull are its short and full muzzle, the round orbits marked by strong, inwardly projecting supra-orbital processes, the rather broad, triangular surface formed by the nasals, and the regularly triangular orifice formed by the external nares, the contracted zygomatic arch, which is curved slightly inwards and which confers little capacity on the temporal fossa, the broad and globular form of the cranium when viewed from above, and its rather elongated oval shape when seen in profile, and the slightly swollen character of the frontal in the middle line. The short muzzle, contracted zygomata, and globose skull are the characters of youth; but the permanent teeth are well developed, with the exception of the last molar.

Measurements of the skull.

	in.	lin.
Extreme length, from præmaxillæ to occiput	4	2
Eminence of frontal sinus to occiput	3	6
Extreme breadth above roots of zygomata	2	9
Breadth at front of temporal fossa, in a line with upper margin of orbit	2	0
Breadth across malars	2	7
Breadth between internal margins of orbits	2	2
Length of nasals in middle line	1	0
Length of external nares	0	6½
Greatest breadth of nares	0	5
Nasal process of frontals to tip of premaxillaries	1	10
Inner angle of orbit to tip of premaxillaries	1	2
Zygomatic notch of malar to tip of premaxillaries	1	9
Length of zygomatic arch to root of postglenoid process	1	4
Greatest breadth of muzzle	1	6
Vertical height of skull on a line with external auditory meatus and anterior margin of foramen magnum	2	2
Posterior margin of palate to anterior margin of foramen magnum	1	3½
Antero-posterior length of foramen magnum	0	8
Posterior margin of foramen magnum to posterior extremity of skull	1	0
Length of palate	1	4½
Greatest breadth of palate	0	10½
Distance between postglenoid processes	2	1
Depth from lower margin of orbit to alveolar border	0	11
Length of lower jaw, from condyle to symphysis	2	8
Depth from tip of coronoid	1	6

	in.	lin.
Breadth of ascending ramus	0	11
Breadth under first malar	0	$7\frac{1}{2}$
Antero-posterior length of symphysis	0	$10\frac{1}{2}$

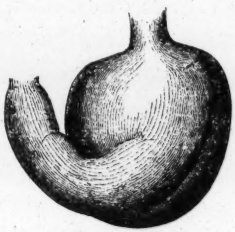
With regard to the teeth, both molars of the upper jaw have each four cusps, and the first deciduous tooth is considerably smaller than the second and first permanent molar. In the lower jaw, the first temporary molar is not so markedly quadricuspidate as the corresponding tooth of the upper jaw, and is much narrower than the tooth behind it, which has four cusps. The upper temporary canine has a pyramidal crown internally flattened and externally convex; and in the lower jaw this tooth has a prominent projection on the posterior margin of the base of the crown. The first permanent molar in the upper jaw has four cusps; but in the lower jaw there is a rudimentary cusp on the posterior margin between the two hinder cusps. In the upper jaw the first permanent incisor is the first tooth to appear, and is followed by the first bicuspid. After these teeth are through the gum they would appear to be followed first by the second molar, then by the second bicuspid, and lastly by the canine.

The tongue is oblong, and of nearly equal width throughout. There are only five circumvallate papillæ. On the border of the tongue, external to these papillæ, there are twelve short vertical slits, the external orifices of as many crypts, each of which is separated from its fellow by a very narrow septum, bearing on each of its sides a more or less triangular papillary-looking body, a considerable portion of which is in the crypt; but it also appears externally, and with its fellow of the opposite side almost invests the outer wall of the partition between the two crypts. The most anterior crypt is very shallow, and has a papilla only on its anterior wall. The two posterior crypts are also very shallow, but they each bear two papillæ. The papillæ are broadest below and narrow above, attached to the sides of the septa, but springing by the apex of the triangle, from the sides of the upper walls of the crypts. These structures, crypts, and papillæ are in a straight line extending over 5 lines. From their position on the sides of the tongue immediately external to the orifices of the buccal pouches, they appear to be specially related to these structures, and have probably a twofold function—the papillæ being gustatory, and the crypts the orifices of numerous glands for the lubrication of the cheek-pouches, while the papillæ doubtless determine whether the food that may have long lain in the buccal sacs or been stored there in haste is fit to be swallowed.

The stomach consists of two portions:—first, a rounded sac which forms the bulk of the organ; and, second, a tubular portion continued on from it to the pylorus, and measuring about 1″ 3‴ in length and 9‴ in breadth. The latter portion describes a well-marked upward curve to the pylorus; and its rather strong internal, muscular coat is prolonged on to near the external margin of the cardiac projection of the globe of the stomach, where it is met by the muscular layer from the left side of the œsophagus, and by muscular fibres which pass

from left to right. The inner surface of the tubular portion, with the exception of its right wall, a concavity, and the continuation of its external muscular coat on to the globe are covered with fine rugæ, and the walls are thick, whilst the remainder of the inner surface is thin and smooth. The form of the stomach thus confers great extension on the lesser curvature.

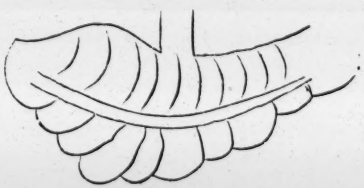
Fig. 1.



Stomach of *Macacus brunneus*, as partially seen from the duodenal end, half nat. size.

The small intestine measures 8 feet in length, while the large intestine is 3 feet 4 inches long. The cæcum, which is 1″ 7‴ in length, is a simple dilatation to the right of where the small enters the large intestine. It is somewhat pointed externally, and, immediately outside the small intestine, measures 2 inches in diameter, having a greater capacity than the commencement of the large intestine.

Fig. 2.



Cæcum of *Macacus brunneus*, half nat. size.

The spleen measures 1″ 5‴ in length, 9‴ in its greatest breadth, and 4‴ in thickness from before backwards. Its right margin is quite straight and flat, whilst its external border curves outwards and downwards as far as the lower two thirds, where it rather abruptly arches inwards and downwards. Its upper extremity is slightly bifid.

The total length of the pancreas, when the gland is laid out, measures 3″ 10‴, the plane portion forming 2″ 8‴, and the head 1″ 2‴. The head, for about one inch, is firmly attached to the duodenum,

into which it opens close to and only a short way (3 lines) below the bile-duct, and 1″ 4‴ below the pylorus.

The liver has an extreme breadth of 4″ 9‴, while the antero-posterior dimension of the middle lobe is 2″ 5‴. The left lobe has a general resemblance to the same lobe of the human liver, and is somewhat triangular and much concave on its under surface. The right and left lobes are deeply cut off from the middle or cystic lobe, which is twice as large as the lateral lobes. The anterior margin of its left third is rather deeply cut, and marks the position of the suspensory ligament. The upper surface of the two thirds to the right of the latter is obliquely crossed by a well-defined groove. The right lobe is quadrangular and very slightly larger than the left lobe, and has an elongated triangular lobule, lying on its under surface from within outwards, and above it a tongue-shaped, smaller lobule, placed before and along the external margin of the lesser curvature. These two lobules have a common origin, from which they diverge in opposite directions; and between and above them there is still another and smaller lobule. The middle or cystic lobe is deeply grooved for the gall-bladder, which occupies the middle of its under surface. The gall-bladder is long and of nearly equal width throughout.

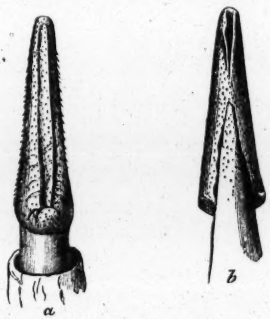
The orifice of the hyoid pouch is immediately above the anterior end of the vocal cords, from which, when the hyoid and epiglottis are divided and the parts are laid aside, the floor of the passage leading into it is seen to be continuous with the convergence of the vocal cords of the two sides. When the larynx is at rest the orifice of the pouch is very small and contracted, and it appears as a mere point at the lower end of the epiglottis; but when the parts are divided it is capable of great distension. The hyoid is much excavated, forming almost an osseous bulla and fully one half of the anterior and superior walls of the pouch, the lower, very distensible wall being formed by a very delicate membrane. The ventricles are only 2‴ in depth, and present nothing worthy of remark, beyond that they are simple lateral crypts between the superior, or false, and the true vocal cords.

The right lung is divided into three distinct lobes, while the left only shows two sections. The uppermost lobe, however, of the left lung is deeply incised into two, so that it is almost trilobular. The inferior lobes of the two lungs are of nearly equal size and are pyramidal; but the anterior-inferior margin of the right lobe is incised for the reception of the external lobule of the azygos lung, while that of the left is entire. There is no appreciable difference between the length of the two lungs, the right measuring 3″ 2‴ and the left 3″ 2½‴. The azygos lung is most closely connected with the inferior lobe of the right, and consists of an elongated (1″ 6‴), three-sided, and downwardly tapering figure, with a lobule on either side of its attachment, one external and the other posterior. The body and posterior lobule fit in between the two inferior lobules of the right and left lungs, and the external lobule into the incision on the inner side of the inferior lobule of the right lung.

The glans penis is 1″ 2‴ in length and about 3 lines in breadth at its widest place near the base. The upper surface is marked by a

longitudinal ridge, corresponding to the position of the bone of the organ; and at the upper extremity the skin of the glans is puckered-in about that end of the ridge. The under surface of the glans is marked anteriorly by the elongated leaf-shaped orifice of the urethra, the inferior end of the penis-bone forming the upper and anterior

Fig. 3.



Penis of *Macacus brunneus*: *a*, upper surface; *b*, lower ditto.

wall of the opening, behind which the urethral canal is considerably dilated for 7‴, the dilatation being marked, on its upper wall, by a ridge formed by the genital ossicle. The glans is set on at a very obtuse angle to the body of the penis; and the whole surface is covered with small recurved spines, very closely set together, and making the surface quite rough. The spines also pass on to the body of the penis between the two divergent halves of the glans; but in that locality they are much smaller than in the former. The prepuce is attached to the penis 3‴ behind the glans. The head of the bone is attached above considerably to the ventral surface of the base of the glans, but at its margin; it curves downwards and forwards, and is exactly one inch long. Its upper half is slightly laterally compressed; but the lower half is cylindrical. The proximal end forms a somewhat rounded head; while the distal end is the narrowest portion.

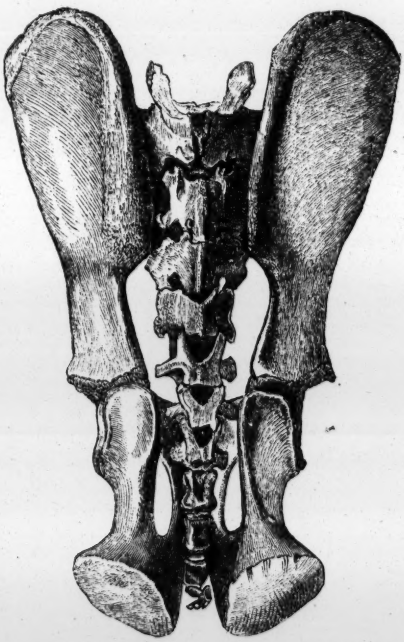
There are twelve dorsal, six lumbar, four sacral, and eleven caudal vertebræ.

Metapophyses appear in the eleventh dorsal vertebra, and are strongly marked in the lumbar region; whilst the anapophyses show in the tenth dorsal—attaining their greatest development in the second, and being reduced to a mere rudiment in the last lumbar. In the last dorsal there is no transverse process, it being resolved into metapophyses and anapophyses.

Only two vertebræ intervene between the ilia; but the anterior

extremity of the pleurapophysial element of the next vertebra joins the posterior angle of the ilium, and is closely applied to the pleurapophysial process of the second sacral. The fourth sacral has the same form as the third, and has a lateral expansion, apparently serially homologous with the process in front of it and with the well-developed pleurapophysial element of the second iliac vertebra. None of these vertebræ, however, have united; but they have all the appearance as if they were to do so. The third sacral vertebra has a low ridge-like spine; but the fourth has its spinous process reduced to a mere rudiment. The pedicles of the anterior zygapophyses of the second, third, and fourth sacral vertebræ are short, and the facets are almost sessile on the arch.

Fig. 4.



Sacrum and caudal vertebræ of *Macacus brunneus*.

The last caudal vertebra reaches only to the middle of the ischial tuberosity; but only nine out of the eleven appear externally in the

tail. The first four have a little more than one inch of antero-posterior extension; while the last five, being very minute and doubled to the left side as a hook, only extend one line and a half in length. The spinous process of the first caudal is reduced to a minute nodule; while it is more strongly developed in the second and third, preserving, however, the same character that it does in the first, and it is altogether lost in the fifth caudal.

The pedicles supporting the anterior zygapophyses are long and strongly developed on the first caudal; but they gradually become smaller as they are traced to the fourth, and in the fifth they are simple nodules. The anterior and posterior pedicles of the fourth and third vertebræ do not touch each other. The posterior zygapophyses of the third caudal are very small diverging processes, which disappear on the fourth vertebra as a minute eminence at the extremity of a ridge which is serially homologous with the pedicles of the anterior zygapophyses of the anterior caudals. The sixth caudal is a simple ossicle, nearly 2 lines in length; and the seventh is reduced to about one third of its size. The eighth caudal vertebra is a minute ossicle, placed to the right of the axis of the spinal column, with the ninth vertebra slightly to the left of its posterior end—the tenth and eleventh vertebral ossicles being placed transversely, from right to left.

In life the tail is rarely carried erect, and is, as a rule, applied over the anus, its latter fourth being doubled upon itself to the left, and serving to fill up the interspace between the upper divergent portion of the callosities; so that the animal sits on this portion of its tail, the upper surface of which is rough and somewhat callous. The latter fourth of the tail contains the hook-like process formed by the last caudal vertebræ; but they are restricted to its base—the remainder of the organ being tough and tendinous, and destitute of vertebral elements. Here, then, is an instance of a Monkey sitting on its tail; and although it may be that it does not invariably do so, I am prepared to state, after careful observation, that it does so very frequently; and there is the more importance to be attached to this observation, because this habit appears to be a peculiarity of the species.

Associated with this habit, we find a tail with its latter fourth bent upon itself and applied between the callosities, and its upper surface roughened by being sat upon; and moreover we find, when we come to examine its structure, that this bent portion contains only a few rudiments of vertebræ at its base, its greater extent being reduced to a tendinous mass. These facts seem to have only one explanation: this tail, from its short size, is in the Monkey's way when it sits down, and frequently becomes placed under the animal while it is in this attitude; and from the circumstance that it does not extend beyond the extremity of the ischial tuberosities, it seems as if the tail originally had been bent round, by the will of the animal, into the interspace between the callosities to escape being pressed between them and the ground, that, in time, the curvature became permanent, fitting in of itself when the organ happens to be sat upon.

These facts might support Lord Monboddo's theory of the gradual disappearance of tails!

5. General List of the Spiders of Palestine and Syria, with Descriptions of numerous new Species and Characters of two new Genera. By the Rev. O. P. Cambridge, M.A., C.M.Z.S.

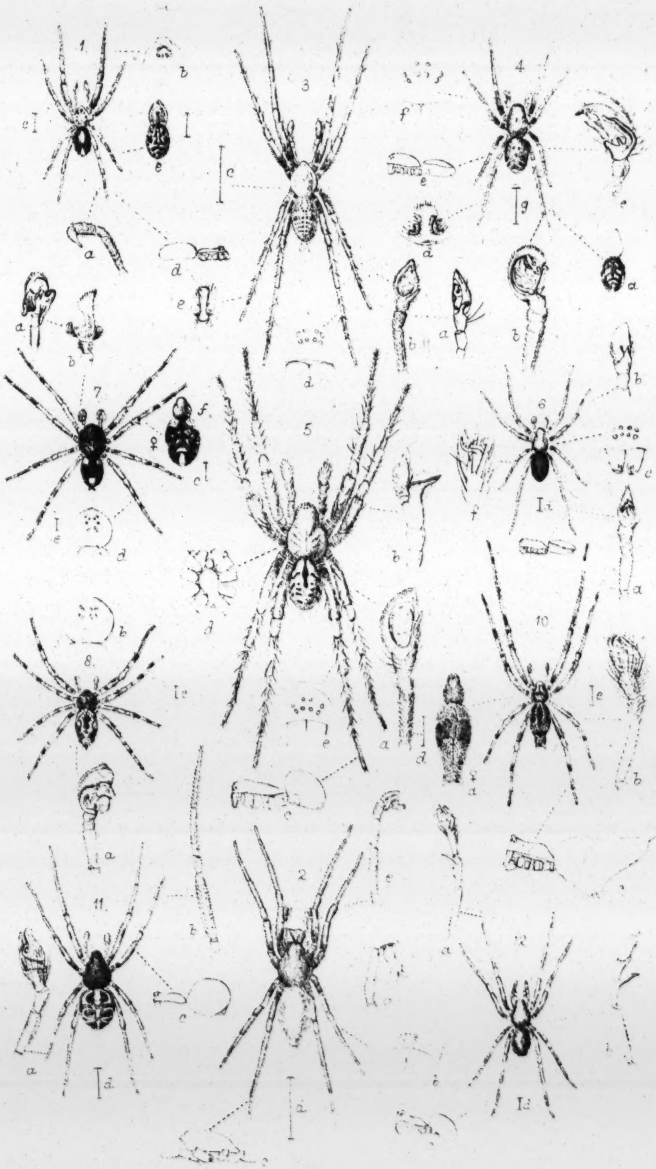
[Received February 2, 1872.]

(Plates XIII.–XVI.)

The following list and descriptions have been prepared from a collection of Araneidea made by myself during a two-months' ride through the Holy Land, between the 16th of March and the 18th of May 1865.

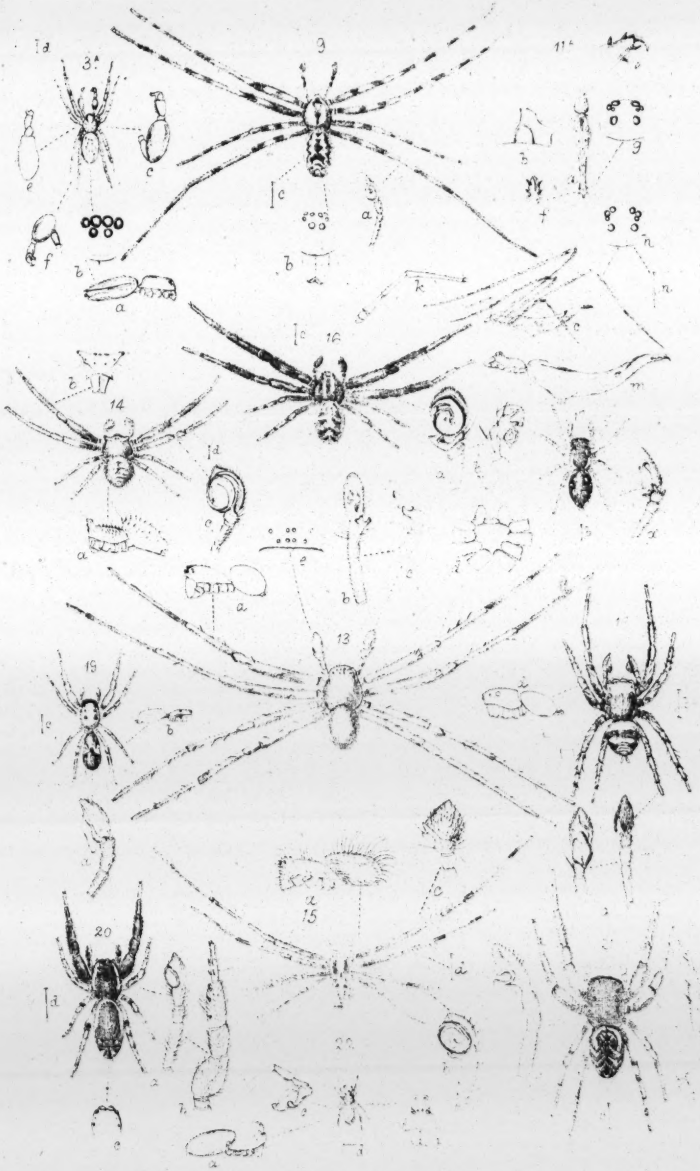
A continuous journey on horseback is not favourable for collecting objects of natural history; but riding through Palestine is not a very rapid affair, and it was therefore usually possible to keep up on foot with the general cavalcade, and so to collect insects and spiders &c. by the way during the greater part of the day. By these means, and by a rather more lengthened sojourn than eastern travellers are commonly in the habit of making on the Jordan Plains, my collection of insects in general amounted to about 700 species of all orders, and of Spiders (Araneidea) to about 300 species; of these last, however, some few were indeterminable from being in an immature state, 278 being determinable. Besides these, various species (not yet worked out) of other orders of Arachnida were captured, viz.:—Acaridea, Phalangidea, Solpugidea, and Scorpionidea. The general report of Palestine, either as an entomological or arachnological district, can scarcely be favourable; except in the more wooded localities, the country is too dry and barren, and it required far harder work to search for either insects or Spiders than is commonly necessary in most districts of Europe. I frequently worked for half an hour without during that time finding a single Spider; and the results of a day's work would often be no more than a dozen species, while numbers of the species found were represented by only single examples, or at most by one of each sex. About one half (136) of the species of Spiders found were met with on the plains of the Jordan, and, for the most part, within a circuit of about a mile from Elisha's Well (Ain es Sultan). A sojourn there of eight or nine days enabled me to work this district pretty closely; of the Spiders found there, 73 species were not found elsewhere, though probably many of them might be if other parts were equally well searched.

The following analysis of the collection will give some idea of the distribution of the 278 determined species among the different families and genera of Araneidea:—



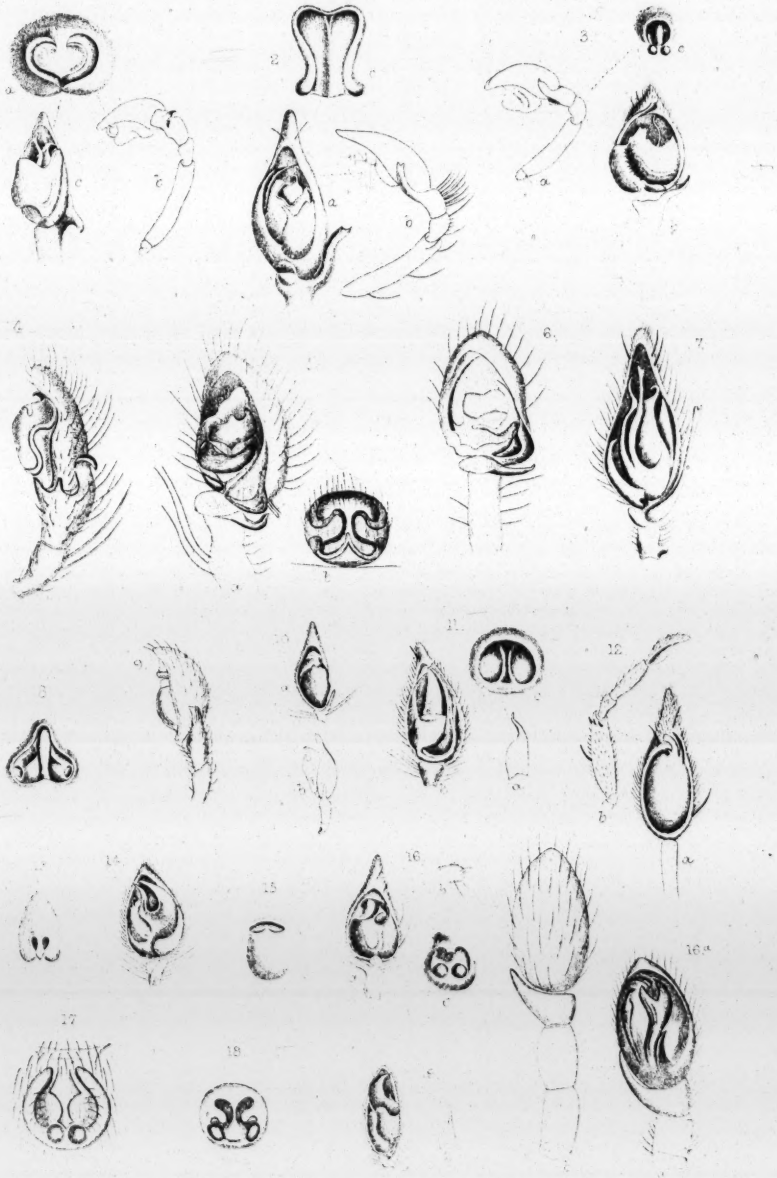
Spiders of Palestine and Syria

BRITISH
MUSEUM
2300 73

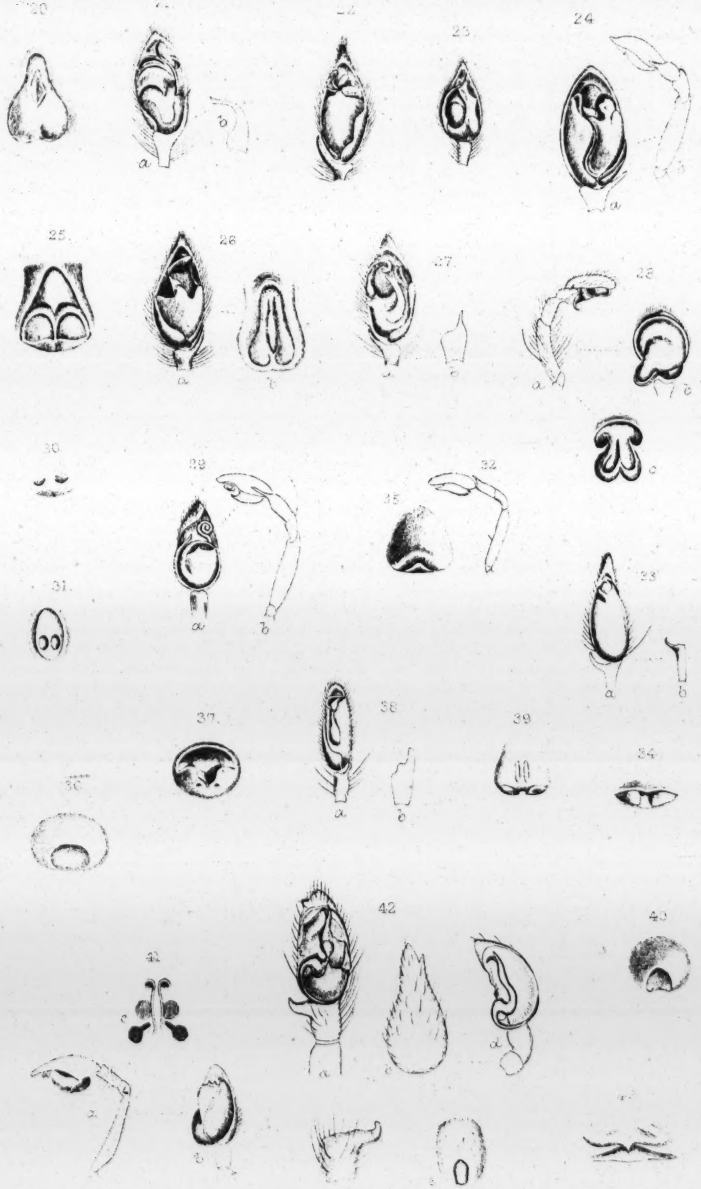


Spiders of Palestine and Syria.

BRITISH
280C73
MUSEUM



BRITISH
2800 73
MUSEUM


20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44

BRITISH
28 OCT 73
MUSEUM

	Number of species.	
	Known species.	New species.
Fam. Theraphosides.		
Gen. Ischnocolus (*Aeuss.*) ...	1	
„ Idiops (*Perty*)	...	1
Fam. Filistatides.		
Gen. Filistata (*Latr.*)	1	2
„ Miltia (*Sim.*)	1	1
Fam. Œcobiides.		
Gen. Œcobius (*Lucas*)	...	4
„ Clotho (*Duf.*).....	1	1
Fam. Dysderides.		
Gen. Segestria (*Latr.*)	1	
„ Ariadne (*Savign.*).....	1	
„ Dysdera (*Latr.*)	...	1
„ Oonops (*Templeton*)...	...	1
Fam. Drassides.		
Gen. Gnaphosa (*Latr.*).....	...	8
„ Drassus (*Walck.*)	4	11
„ Melanophora (*Koch*)...	3	9
„ Micaria (*Westr.*)	...	5
„ Phrurolithus (*Koch*)...	...	1
„ Cheiracanthium (*Koch*)	4	2
„ Clubiona (*Latr.*)	1	3
„ Trachelas (*L. Koch*) ...	...	1
„ Hecaërge (*Bl.*)	...	2
„ Agrœca (*Westr.*)	...	1
Fam. Palpimanides.		
Gen. Palpimanus (*Duf.*) ...	1	
Fam. Dictynides.		
Gen. Eresus (*Walck.*)	3	
„ Dictyna (*Sund.*)	2	3
Fam. Agelenides.		
Gen. Amaurobius (*Koch*) ...	1	4
„ Lachesis (*Savign.*).....	1	2
„ Palæstina (*Cambr.*), g.n.	...	3
„ Enyo (*Savign.*)	1	3
„ Cithæron (*Cambr.*), g.n.	...	1
„ Agelena (*Walck.*)	1	
„ Textrix (*Sund.*).....	...	2
„ Tegenaria (*Latr.*)	1	1
Fam. Hersiliides.		
Gen. Hersiliada (*Sim.*).....	..	1

	Number of species.	
	Known species.	New species.
Fam. Scytodides.		
Gen. Scytodes (*Latr.*)	1	
„ Loxoscelis (*Hein. et Lowe*).....	1	
Fam. Pholcides.		
Gen. Pholcus (*Walck.*).....	1	
Fam. Theridiides.		
Gen. Ariamne (*Thor.*)=Ariadne (*Dol.*)	...	1
„ Argyrodes (*Sim.*).....	1	1
„ Theridion (*Walck.*) ...	9	6
„ Ero (*Koch*).....	1	
„ Ctenophora (*Bl.*)	1	
„ Lathrodectus (*Walck.*)	3	1
„ Erigone (*Savigny*) ...	3	6
„ Linyphia (*Latr.*)	2	2
„ Pachygnatha (*Sund.*)..	2	
Fam. Epeïrides.		
Gen. Tetragnatha (*Latr.*) ...	...	3
„ Epeïra (*Walck.*)	9	4
„ Argiope (*Savign.*).....	1	1
Fam. Uloborides.		
Gen. Uloborus (*Latr.*)	2	
Fam. Thomisides.		
Gen. Thomisus (*Walck.*) ...	9	9
Fam. Philodromides.		
Gen. Philodromus (*Walck.*).	2	3
„ Sparassus (*Walck.*) ...	4	
„ Heteropoda (*Latr.*) = Olios (*Walck.*)	...	1
„ Selenops (*Duf.*).....	1	
Fam. Sphasides.		
Gen. Pasithea (*Bl.*)	...	1
„ Oxyopes (*Latr.*)	2	2
Fam. Lycosides.		
Gen. Lycosa (*Latr.*)	10	5
„ Ctenus (*Walck.*)	...	1
„ Dolomedes (*Latr.*) ...	...	1
Fam. Salticides.		
Gen. Salticus (*Latr.*).....	33	29
Totals ...	127	151

From the above analysis it will be seen that 19 families, comprising 59 genera, are represented. The distribution of genera into families has been made somewhat tentatively; unsatisfied with existing systematic arrangements, I have given the above from a scheme drawn up in MS. several years since, but of which, as a whole, opportunity has not yet offered for the publication. The Spiders of the family *Salticides* have been for the present included under one genus (*Salticus*, Latr.); but in the details and descriptions a notification will be appended of the generic divisions adopted by M. Simon, but which are some of them, as it seems to me, scarcely tenable as distinct genera. The families most numerously represented are the *Drassides* (55 species) and *Salticides* (62 species), the two together monopolizing 117 species, or nearly half of the whole number met with. Both these groups consist of Spiders peculiarly fitted for an arid, sterile, stony land—the *Drassides* being found almost exclusively beneath stones and pieces of detached rock, while the *Salticides* in general delight to jump about and disport in bright sunshine on the most barren and stony places, or among the stunted shrubs and flowers with which such spots are sometimes scantily clothed. Of the whole number of determinable Spiders discovered (278 species), 151 species appear to have been hitherto undescribed, some few others having been described from European examples, by other arachnologists, since the collection was formed; forty-three out of the fifty-five species of *Drassides*, and twenty-nine of the sixty-two species of *Salticides*, appear to be undescribed. This great richness in undescribed species is easily accounted for by the fact that (as I believe) scarcely any Spiders have ever before been collected in those regions of the world. The general character of the Araneidea of Palestine and Syria is strictly European; few, even of those found on the plains of the Jordan, give any idea of a transition to a tropical fauna; all the known genera and most of the more special groups have European representatives; and the Spiders of the two new genera characterized present nothing in form or structure which would make them unlikely to be met with in suitable localities in the south and south-eastern parts of Europe. Many species of the Spiders in the present collection were met with in Egypt in 1864, especially of the family *Drassides*; the Egyptian collection, however, remains yet to be thoroughly worked out and collated with that made in Syria and Palestine. It may perhaps be interesting to some readers to state that the route followed was from Jaffa by Ramleh, El Birriyeh, and Kuriet-el-Nab to Jerusalem, thence to Jericho and the plains of the Jordan, from Jericho by Marsaba and the pools of Solomon to Hebron, returning thence by Bethlehem to Jerusalem, and then *viâ* Bethel, Nablous, Samaria, Jenin, the plains of Esdraelon, Jezreel, and Nain to Nazareth; from Nazareth the route lay across the Kishon to Mount Carmel and Haifa, thence to Kefr Menda and Cana-el-Jelil (Cana of Galilee), from Cana to Tiberias and the Sea of Galilee, thence by Tel Hûm and Safed to Kedes, Hûnin, and Banias, from Banias by Hasbeiya and Rasheiya over the skirts of Mount Hermon to Damascus, from

Damascus by the river Abana, Abila, Suk Wady Barada, and Surghaya to Baalbec and the Lebanon, and so to Beirût. I regretted much not being able to work the Lebanon district more thoroughly than the mere ride through some portion of it enabled me to do: just at the time of my visit to that part (middle of May) insect life was becoming abundant, and I do not doubt that among the Araneidea the number of species in the families *Theridiides* and *Epeïrides* (some groups of both which families are but scantily represented in my collection) might have been greatly added to; the time and money, however, allotted to my eastern trip had come to an end; and I took leave of those most interesting regions with the greater regret, inasmuch as only the day previous to my departure I found several of the most curious and least-European-looking of the Spiders in the collection, viz. *Thomisus setiger* (p. 307), *Ariamne longicaudata* (p. 277), *Argyrodes syriaca* (p. 279), *Idiops syriacus* (p. 216), and *Ctenophora monticola*, Bl. (p. 287).

Before concluding this short introductory notice I must express my thanks to Dr. L. Koch, of Nürnberg, and Mons. Eugène Simon, of Paris, who have given me their valuable assistance in working out the two large families before mentioned (*Drassides*, Dr. Koch; *Salticides*, M. Simon). I had hoped long ere this to have seen the new species of *Drassides* described and figured by Dr. Koch in his invaluable work 'Die Arachnidenfamilie der Drassiden.' This work is still in an unfinished state, and its continuation indefinitely postponed. The names of nearly all the new species of *Drassides* are those conferred upon them by Dr. Koch, and communicated to me in his letters on the subject; these names I have, with Dr. Koch's kind consent, retained in the descriptions given below. As alluded to before, the systematic arrangement adopted in the following pages is taken from an unpublished scheme drawn up by myself several years ago, but partially adopted in the arachnological portion of the 'Zoological Record,' vol. vii. 1870, pp. 207–224.

N.B.—Since writing the above Dr. L. Koch has most generously placed at my disposal for this paper all the beautifully executed dissectional sketches he had executed of the Palestine and Syrian *Drassides* from the examples described below.

Order ARANEIDEA.

Fam. Theraphosides.

Without doubt the Syrian and Palestine species of this family would be greatly increased by any arachnologist with leisure to work special districts closely; but a scrambling ride gives very little chance of meeting with them.

Genus Ischnocolus (Ausserer).

Ischnocolus syriacus, Aeuss. Beiträge zur Kenntniss der Arachnidenfamilie der Territelariæ, Verh. z.-b. Gesellsch. Wien, 1871, Bd. xxi. p. 189.

Adult males and females at Jerusalem.

Genus IDIOPS
(Perty, Del. An. Art. Bras. p. 197).

IDIOPS SYRIACUS, Cambr. P. Z. S. 1870, p. 107, pl. viii. fig. 3.

Two females, one adult, the other immature, were found in cylindrical holes in a bank near Beirût; the holes were lined with silk, and their upper ends closed with a hinged lid similar to those of *Nemesia cœmentaria* (Latr.).

Fam. FILISTATIDES.

Genus FILISTATA (Latr.).

FILISTATA ATTALICA, Koch, Die Arachn. v. p. 6, pl. 146. fig. 343.

Adult females in holes and crevices of trees and buildings at Hebron and Damascus.

FILISTATA ALBIMACULATA, sp. nov. (Plate XIII. fig. 1.)

Male adult, length 1½ to 2 lines.

The *cephalothorax* is of an oblong-oval form, flattened above, and very slightly constricted laterally at its fore extremity; it is of a yellow-brown colour, slightly tinged with red, and narrowly margined with black-brown, the ocular region being suffused with black; the normal furrows and indentations are indicated by blackish-brown lines; and the whole is thinly clothed with coarse white and mostly adpressed hairs.

Eyes eight in number, considerably unequal in size, and grouped closely together on a slight oval eminence; they form two groups, an outer and an inner one: the outer one is of four large eyes (two on either side nearly contiguous to each other, the foremost of each pair being the largest), forming a transverse oval; the inner group, also of four eyes, is much smaller, and forms a trapezoid whose foremost side is shorter than the hinder one; the two foremost of these eyes are smaller than the others, in fact the smallest of the eight. *Clypeus* prominent.

Falces small, prominent; fang small.

Legs rather long, strong; relative length 1, 2, 4, 3; they are of a yellow-brown colour, slightly tinged with red; the femora and tibiæ of the first and second pairs, and the femora of third and fourth, are strongly suffused with black-brown; the femora and tibiæ of the first pair are much stronger and longer than those of the other legs. There are a few spines beneath the tibiæ of the first pair; and all the legs are clothed with coarsish hairs, those on the genual and metatarsal joints of the first pair being very conspicuously white. There were, as far as I could ascertain, two terminal tarsal claws.

Palpi moderately long and strong; they spring at a considerable distance from the base of the maxillæ, and are similar to the legs in colour; the radial joint is long, strong, and tumid; the digital short, small, and difficult to distinguish separately from the base of th-

palpal organs, which consist of a single basal bulb prolonged into a longish beak tapering to a fine sharp point which is slightly bent.

Maxillæ long and strong, greatly curved over the labium, which they completely encircle. *Labium* rather long, narrowest just below the middle, and blunt-pointed at the apex.

Abdomen larger than the cephalothorax, oval, and convex above; it is of a velvety-black colour, with two very conspicuous white markings in the central longitudinal line of the upperside; the foremost of these markings is the largest, and is of an oval form, pointed before, and broad and rounded behind; the hinder one is of a somewhat rounder form, and is situated just above the anus. These markings are formed by white hairs.

The female differs considerably from the male in the colour and markings of the abdomen, which is of a browner hue and furnished thickly with yellowish-grey and whitish hairs, some of which latter colour are disposed in spots and lines forming a somewhat regular pattern, a portion of which consists of some transverse angular bars, or chevrons, on the hinder part.

This very distinct and conspicuous, though small, species was not rare beneath stones on the plains of the Jordan near ancient Jericho. The males were active when disturbed, but the females quite sluggish. I did not observe any webs or snares; but these may have been destroyed in the lifting up of the stones. It is very nearly allied to a Spanish species (*Filistata nana*, Sim.) lately described by M. Eugène Simon (Rev. et Mag. Zool. 1868); but though resembling it in general form and size, it differs in the pattern on the abdomen (which in *F. nana* is similar in both sexes), and also in the palpal organs of the male, the bulb being smaller, the prolongation from it tapering more gradually, and the whole longer than in the species above described. The habitat also appears to differ; according to M. Simon *F. nana* is found in the fissures and crevices of rocks.

FILISTATA HIRSUTA, sp. nov.

Female immature, length $1\frac{3}{4}$ lines.

This species, of which but a single example was met with, is allied to *F. attalica* (Koch); it may, however, be at once distinguished by its rougher appearance, and the greater proportional length of its legs, especially of those of the first pair.

The *cephalothorax* is yellow, narrowly margined with black, and with a longitudinal central band of dusky black running from the margin of the clypeus, including the eyes, back to the hinder margin, where it tapers to a point; the sides are also marked with converging brownish-black lines; and the whole is clothed with coarsish adpressed hairs of a yellowish-grey colour. The *eyes* appeared to be normal in their relative size and position. The *legs* are yellowish, somewhat obscurely suffused with brown, and furnished with rather coarse brownish-yellow hairs, those on the femora being numerous, curved, and spinous in their character; they have none of the black maculæ which I have observed in all the examples of *F. attalica* that have come under my notice; their relative length

is 1, 4, 2, 3. The *palpi* are long, strong, similar to the legs in colour, and furnished with coarse hairs.

The *abdomen* is of a short oval form, tolerably convex above; the hinder extremity projects over the spinners, and the fore extremity over the base of the cephalothorax; it is of a dull sandy yellow-brown colour, thickly clothed in front and on the sides with short coarse yellowish hairs, leaving a bare space along the middle and over the hinder extremity of a pointed form, the point directed forwards: possibly this bare portion may have been caused by denudation; but from the regularity of its form I should rather judge it to be a specific character.

The single example found was under a stone on the skirts of the Lebanon.

Genus Miltia (Simon)=*Enyo* (Luc. ad partem).

Miltia amaranthina, Luc. Explor. en Algérie, Arachn. p. 232, pl. 14. fig. 7.

The male of this Spider having never yet been described, the following notes upon it will not be out of place. It is rather smaller than the female, which it resembles in general form and colour: the *palpi* are moderate in length and strength; the radial and cubital joints are short, the latter being the shortest and rather produced in a somewhat quadrate form at its fore extremity on the upperside; the outer corner of the produced part has a small pale coloured apophysis; the digital joint is large and of an oval form; the papal organs are highly developed and very prominent, not very complex, consisting chiefly of a large somewhat rounded white corneous lobe encircled, just beneath the margins of the digital joint, with a strong spiny-looking deep-red-brown fillet.

M. Lucas (Explor. en Algérie, Arachn. p. 232) includes *M. amaranthina* in the genus *Enyo*, recognizing at the same time its utter want of structural affinity with *Enyo*, except in the position of the eyes. Walckenaer subsequently formed the family "Incertaines" for it within his genus *Clotho*, in which he also included *Enyo* merely from the similarity of the position of the eyes. Dr. Thorell (Europ. Spid. p. 108) expressed his opinion that it ought to be made the type of a separate genus; and just previously to the publication of that opinion M. Simon (Rev. de Zool. 1869) formed for it the genus *Miltia*, still, however, retaining it alongside of *Enyo* in his family *Enydes*, concluding his remarks in the following words:—"Par la position et nature de ses yeux, ainsi que par l'ensemble de ses formes, ce nouveau genre ne peut être eloigné des *Enyos*; cependant les pièces de la bouche sont tout-à-fait différentes, et forment une curieuse exception dans la famille des *Enydes*." No two Spiders, however, as it seems to me, could be more different in the "ensemble de ses formes" than *M. amaranthina* and the typical *Enyo*—the latter being of a short, very convex form, with long slender legs, the former elongate, flattened, and short-legged; this, joined to the totally different form of the maxillæ and labium, appears to neces-

sitate its complete removal from *Enyo*: it is probably with *Filistata* (Latr.) that its family affinities are to be found, and, in accordance with this opinion, I have here placed it in the family *Filistatides*.

MILTIA DIVERSA, sp. nov.

Male adult. This species resembles *M. amaranthina* in size, form, and colour; but it differs remarkably in the structure of the palpal organs; the digital joints of the palpi are smaller, while the form of the radial joint differs but little. The palpal organs are far less prominent and not so highly developed; they are entirely destitute of the strong, nearly black, corneous fillet, which in *M. amaranthina* surrounds their whole outer margin just beneath the margin of the digital joint. The eyes also, though similar in position, are far less visible, it being difficult to see them accurately. A single example was found under a stone at Hasbeiya.

Fam. ŒCOBIIDES.

Genus ŒCOBIUS (Luc.).

ŒCOBIUS TRIMACULATUS, sp. nov. (Plate XIII. fig. 7.)

Male adult, length 1 line, female adult 1½ line.

In general structure and characters this species is very similar to *Œ. domesticus* (Luc.) and *Œ. annulipes* (id.), as also to *Œ. maculatus* (Sim.); but it differs from all three in the relative position of the eyes, and notably from the first two in colour and markings.

The male has the *cephalothorax* of the deepest black-brown colour: the *eyes* are not very unequal in size; they are placed in a compact group on an elevation of the caput, which rises gradually from the surrounding surface, but leaves a considerable and prominent clypeus, the margin of which is pointed in the centre; they are eight in number (that is if two flat, irregularly formed, shining white spaces, looking like rudimentary or atrophied eyes*, are really eyes or their representatives), and may be described as in two transverse curved rows of four each; the two lateral eyes on each side of the front row are near together, the inner ones being the largest of the eight; close behind each of these pairs is the lateral eye, on either side of the hinder row, forming with the pair in front of it a triangle in which all the eyes are about equally distant from each other. Each of the two eyes forming the central pair of the hinder row is depressed, of a bent oblong form, placed obliquely to and distinctly separated from the lateral on its side.

* These two eyes (the two middle ones of the hinder row) have not been considered to be eyes by either M. Lucas, who founded the genus, or Mr. Blackwall, who has since described a new species of it. M. Simon, however, as well as Dr. Thorell, consider them to be true eyes. Not having had an opportunity of examining them under a lens of high power, I cannot speak positively on the point; but my impression is that they are undeveloped eyes, or perhaps the sites where perfect eyes once existed, but which have now become, from some train of causes, devoid of ocular structure properly so called. Imperfectly developed eyes exist also in some other species of Spiders.

The *abdomen* is of a glossy jet-black colour, marked on the upper-side with three large brilliantly white spots; one on each fore corner or shoulder of the abdomen; these are of a subtriangular form, with the most pointed angles of each directed towards one another; the third spot is of a somewhat diamond-shape, with its fore angle truncated, and is seated just above the anus. The *legs* are pale yellow, the tibiæ being broadly annulated with deep brown-black; the metatarsi are almost wholly suffused with the same colour, while the tarsi are of paler duller hue. When in a state of rest the legs of this and other species are spread out in a radiated form; they do not differ much in length; those of the third pair appear to be the shortest, and those of the first pair slightly the longest. Lucas gives the relative length of the legs of those species known to him as 1, 4, 3, 2; but, from the difficulty of accurate measurement, I have not been able to verify this in regard to the present species. The *palpi* are black, and have the digital joints and palpal bulb of large size; the radial is shorter than the cubital joint; neither of them presents any thing remarkable in its form; the palpal organs are highly developed and prominent, consisting of several projecting corneous processes, of which the two largest and longest are directed backwards. The spinners are eight in number, two very short, small, and supernumerary being situated in front of the six ordinary ones; of these the superior pair are the largest and longest, and are two-jointed, curving upwards over the extremity of the abdomen; between them is the anus, which is large and seated on an oval prominence fringed with divergent or somewhat radiating strongish pale hairs, which appeared to be of a papilliform nature.

In the *female* the cephalothorax is of a more oval form, as well as less black and glossy; the abdomen also differs in having seven or eight smaller white spots on the upperside in addition to the three large ones, between which the smaller ones are regularly grouped; four of them form a transverse curved row nearly across the middle of the abdomen; behind these are two more, and between them and the hinder one of the large spots is another largish one, or two small and confluent, forming with the rest a sector of a circle. Some slight variation exists in different examples in this position of the spots; and the two large ones near the fore margin are sometimes nearer together than the two corresponding spots on the abdomen of the male. The *legs* of the female are all pale yellow, annulated with black-brown; the metatarsi of the fourth pair are furnished with calamistra, but the male has no trace of them.

Although nearly allied to *Œ. maculatus* (Sim. Mém. Liége, 1870), of which the female only has been recorded, I think the present is a distinct species; it is not rare on the plains of the Jordan, where alone it was met with. The males were usually very conspicuously displayed with extended legs on the surface of stones and broken pieces of rock; they were very agile when disturbed. The females were generally concealed beneath thin sheets of web spun over depressions on the faces of the stones, leaving a sort of tubular-shaped place of exit, through which, when disturbed, they rapidly endea-

voured to escape. M. Simon is of opinion that *Œcobius* should be placed in the same family as *Hersilia*, and removed from close proximity to *Clotho*; the relationship, however, between the two former appears to me more than doubtful, while between *Clotho* and *Œcobius* there is not only a most marked resemblance in general form, but both have a very peculiar and special point of detail in structure (the fringed anus); other points also of structure are so similar that it is not easy at first to distinguish them even generically.

ŒCOBIUS TELIGER, sp. nov. (Plate XIII. fig. 8.)

Similar in size, general form, and structure to *Œ. trimaculatus*, this species may be at once distinguished by its colour, and the markings on the abdomen. The *cephalothorax* is of a deep blackish-brown hue, the legs and palpi are pale yellow, thinly annulated with black-brown. The *abdomen* is of a dull cream-white colour above, the white produced by cretaceous-looking spots intersected irregularly with dusky lines; on its centre is a longish black marking bearing a rough resemblance to a double arrow-head, or of a diamond-shape, in front, followed behind by, and connected with, a cruciform patch; on the outer sides of this marking are some black spots always near to, and sometimes connected with and forming part of it; the sides are black, which colour encroaches in parts on the white of the upperside, and forms behind, just above the spinners, a largish triangular white patch, connected by a neck or shaft with the rest of the white ground of the upperside; the longest point of this triangular patch is directed backwards; thus it has the form of a spear or barbed arrow-head, and well marked in all the examples of both sexes that I have seen: the underside is of a dull whitey-brown colour.

The *palpi* of the male are strong; the digital joints large, but not so large as in *Œ. trimaculatus*; the palpal organs are prominent and highly developed, having some strong corneous projections, but differing in their structure from those of that species. The *eyes* are grouped in the same general form as those of the species just mentioned, but they occupy a proportionally wider space, and form two rather compact groups of four each; the irregular flattened intermediate pair of the hinder row are large and of an oblong form, and each of them is placed obliquely rather inside and behind, though contiguous to, the lateral of the same row on its side.

The *cephalothorax* of the female is rounder than that of the male, but in colour and markings it resembles that sex.

Adults of both sexes were found on stones and rocks at Beirût, Tiberias, Jerusalem, and Hebron.

ŒCOBIUS AFFINIS, sp. nov.

This spider is very nearly allied to *Œ. teliger*, but differs in having a paler cephalothorax, which is yellowish with a dusky brownish hue in the region of the eyes and in a line with that backwards, as also on the margins and in the directions of the normal indentations; the abdomen is also less distinctly marked, and, though the general character of the markings is similar, the white ground-colour prepon-

derates; the legs are yellowish, thickly annulated with black-brown; the palpi of the male have a small transversely oblong black spot on the upperside of the radial joints, and the palpal organs are much simpler in structure than in *Œ. teliger*, though well developed and prominent; the position of the eyes appeared to be nearly the same.

Adults and immature examples of both sexes were found on stones and rocks at Hasbeiya, and also at the foot of the Lebanon range near Ain Ata; immature examples of, I believe, this species were also found at Jerusalem. It is nearly allied to a Madeiran species, *Œcobius navus* (Bl.), of which only the female has been described, and which appears to be more closely and thickly mottled and marked with black and white on the abdomen, and more distinctly annulated on the legs.

ŒCOBIUS ALBIPUNCTATUS, sp. nov.

The female is similar to *Œ. trimaculatus* (♀) in size and form; but the cephalothorax is rounder. The *abdomen* is of a uniform black, marked above with a few minute white spots symmetrically arranged, though rather differently in the two examples found. Close above the spinners is a larger white spot of a somewhat diamond-shape; the *legs* and *palpi* are yellow, broadly and very distinctly and regularly annulated or, rather, banded with black.

Although nearly allied to *Œ. trimaculatus*, it is certainly a distinct species; the fringe of bristly hairs surrounding the anus is of a well-marked character.

Two adult examples on a rock near Damascus.

Genus CLOTHO (Dufour).

CLOTHO LIMBATA, Koch, Die Arachn. x. p. 89, pl. 350. fig. 816.

An immature female of this fine species was found under a piece of detached rock near Jerusalem.

CLOTHO SEPTEMPUNCTATA, sp. nov.

Male (not quite adult), 4 lines long.

This species is similar to *C. limbata* in form and structure. The whole of the fore part of the Spider is yellow, but of a clearer, brighter hue than in that species; the abdomen is dull black, but the upperside, instead of being surrounded by a continuous border of a whitish-yellow colour, has in its place a marginal row of seven large yellow spots; four of these form nearly a square on its fore half, and the three others are in a triangle above the spinners, the apex directed backwards. It is possible that in some examples these spots may become nearly confluent, and so form a band very similar to that on the abdomen of *C. limbata*; but still some other specific characters, such as a slight difference in the relative position of the eyes, and the less dense armature of the legs with hairs, bristles, and fine spines, seem to show that it is quite distinct from that species, of which six adult examples found in 1864 at Alexandria (Egypt)

presented no variation whatever in the uniformity and continuity of the abdominal border.

An immature male was found at Jerusalem under a piece of detached rock in the valley of Hinnom, an immature female in a similar situation near Ain Ata, and another at Tiberias.

Fam. Dysderides.

Genus Segestria (Latr.).

Segestria perfida, Walck. Ins. Apt. i. p. 267.

An adult male at Jerusalem.

Genus Ariadne (Savigny).

Ariadne insidiatrix, Savigny, Arachn. d'Egypte, pl. 1. fig. 3.

Immature females of this Spider were found in crevices of a bank near Beirût.

Genus Dysdera (Latr.).

Dysdera westringii, sp. nov. (Plate XIII. fig. 2.)

Male adult, length $4\frac{1}{2}$ lines; female adult, 6 lines.

In general form, colour, and appearance this species is very similar to *D. erythrina* (Walck.) and *D. rubicunda* (Koch), but from both it may be distinguished by the form of the palpal organs, as well as by the surface of the cephalothorax and the sternum, which are closely freckled with impressed dots or punctures. The two foremost eyes are the largest of the six; the falces are shorter and less powerful than in the above-mentioned species; and the palpal organs are more attenuate, much constricted near the middle, and are furnished at their extremity with a slender, curved, prominent, black spine. The *abdomen* is similar in colour to that of *D. erythrina*, but (in spirit of wine) has a mottled or reticulate appearance.

It is not uncommon throughout Palestine and Syria, and I met with both sexes adult under stones in various places from Hebron to Damascus. It is with great pleasure that I connect with this Spider the name of M. Nicolas Westring, who has laboured long and successfully in the working out of Swedish Spiders.

Genus Oonops (Templeton).

Oonops punctatus, sp. nov. (Plate XIV. fig. 3a.)

Male adult, length $\frac{4}{5}$ of a line.

The whole of this Spider is of a pale, but brightish, yellow-brown colour, the legs being rather lighter than the rest.

The *cephalothorax* is oval, pointed, but not constricted laterally before; it is glossy and very sparingly furnished with inconspicuous hairs.

The *eyes* (six in number) are large; four, almost contiguous to

each other, form a nearly straight transverse line, and, obliquely placed, in front of the lateral on either side is another; the two centrals of the hinder row are round; the rest appeared to be slightly oval in shape. The *legs* are moderately long and strong, especially the femoral joints.

The *palpi* have the humeral joints inordinately large and tumid, the cubital joints are very small, the radials larger; the digital joints are small, and the palpal organs simple, not very unlike those of *Dysdera erythrina* (Walck.), they have a reddish prominence near their extremity. The *sternum* is somewhat heart-shaped, with a strong reddish indentation opposite the insertion of each leg; the *maxillæ* are short, strong, considerably inclined towards the labium, and narrower at the extremities than at the bases; the *labium* is small and short, but broad in proportion, and of a somewhat subtriangular form.

The *abdomen* is oval, and not very convex above; it is encased in an upper and under coriaceous kind of integument; this is united in front, but separated along the sides and behind, where it gapes open a little, the spinners protruding through the cleft: both the upper and the under sides are sparingly furnished with hairs, and thickly dotted with minute punctures; the spiracular openings are (as far as I could ascertain, though I am not certain upon the point) four in number.

An adult male of this minute but most remarkable and distinct Spider was found under a stone on a wall close to Hasbeiya.

Fam. Drassides.

Genus Gnaphosa (Latr.)=*Pythonissa* (Koch).

Gnaphosa riparіensis, sp. nov. (Plate XV. fig. 1.)

Male adult, length $2\frac{1}{2}$ to 3 lines; female adult, 4 lines.

This species is very similar to *G. exornata* (Koch), both in size and markings; but it may be easily distinguished by the structure of the palpi and palpal organs.

The *cephalothorax*, which is of ordinary form, but rather flattened above, is of a yellow-brown colour, marked rather irregularly on the sides with blackish brown (indicating, however, the ordinary grooves and converging indentations); and the whole is clothed with a greyish pubescence.

The *eyes* are placed in two transverse curved rows of four each, the curves directed towards each other, and forming a short transverse oblong figure, wider at the ends than in the middle; each of the hind central eyes is nearer to the lateral of the same row, on its side, than they are to each other; the fore centrals are larger than the fore laterals, and the interval between them is greater than that between each and the lateral on its side.

The *legs* are tolerably strong, rather long; relative length 4, 1, 2, 3; they are of a yellow-brown colour, thinly furnished with hairs and fine spines, and, in some parts, with a short grey pubescence;

each tarsus terminates with two curved pectinated claws, beneath which is a small claw-tuft.

The *palpi* are short and rather strong; the *radial* is rather shorter than the cubital joint, and has its outer extremity produced into a strong, broad, red-brown apophysis, from the upperside of which springs an almost perpendicular conical projection with a small, rather sudden, sharp, curved, corneous point at its extremity; the palpal organs are well developed, prominent, but not very complex, with a strongish curved corneous process at their extremity.

The *falces* are rather long, strong, and conical; and a little prominent near their base in front. The *maxillæ* are strong, considerably curved, and inclined strongly over the labium, and are also broadly impressed in a transverse direction.

The *labium* is oblong, broader at the base than at the apex, which is rather squarely truncated; these parts are of a dark reddish-brown colour, the maxillæ being dull yellowish white at their extremities. The *sternum* is large, heart-shaped, and of a yellow-brown colour, the centre being strongly suffused with blackish.

The *abdomen* is of an oblong-oval form, and of a dull brownish-yellow colour, clothed with short fine grey and yellowish hairs; in the central line of the fore part of the upperside there is a strong oblong black-brownish patch, followed behind by a close series of strongish angulated blackish bars or chevrons, which have a tendency to become confluent, but do not extend to the spinners, round which are two or three blackish spots; the sides are marked irregularly with blackish brown, and the underside has two parallel longitudinal black-brown lines throughout the greater part of its length: the spinners are rather long and prominent; those of the inferior pair are the strongest and generally longest, and of a dark blackish-brown colour, the rest being of a dull whitish yellow.

The *female* resembles the male, but is larger; the genital opening is simple, being of a transverse somewhat oval form margined with red-brown, and has a somewhat triangular space within it; the palpi of the female end with a curved black pectinated claw.

Adults of both sexes were found beneath stones on the plains of the Jordan, near Jericho.

GNAPHOSA PLUMALIS, sp. nov. (Plate XV. fig. 3.)

Male adult, length 3 lines.

In form and general structure, as well as in the position of the eyes, this species nearly resembles *G. ripariensis*, but it may be distinguished at once by its generally lighter colour and yellower ground, as well as by the structure of the palpi and palpal organs. The whole of the fore part, including the legs and palpi, is of a yellowish colour; the cephalothorax has a narrow black marginal line; and some small blackish markings indicate the junction of the caput, thorax, and thoracic segments; and the whole is clothed with a short grey pubescence. The *legs* are moderately long and strong; their relative length is 4, 1, 2, 3, and they are furnished with hairs

and spines, the latter chiefly on those of the two hinder pairs; each tarsus ends with two curved pectinated claws, beneath which is a small claw-tuft.

The *palpi* are short; the radial is rather shorter than the cubital joint, and has a small, tapering, pointed, red-brown apophysis at its outer extremity; this apophysis is rather prominent outwardly, and has its extreme point a little bent, or crooked, upwards; the digital joint is short, oval in form, pointed at its fore extremity; the palpal organs are prominent, not very complex, and with one or two small corneous spines at their extremity. The *abdomen* is pale yellow, clothed with a grey pubescence; the fore half has a longitudinal central yellow-brown bar, on either side of which towards its hinder part is a diffused blackish spot or marking, followed by another of a similar kind; to these, on either side, succeed, in a longitudinal line, three or four other similar but smaller markings, being the indications of the ordinary transverse angular bars or chevrons, broken off at their angles, showing, however, several broad, strong, angular, pale yellow bars, owing to the ground-colour of the abdomen being lighter within the black markings than on the outside; which last is also more or less sprinkled with small brownish points, these being less visible along the central line. The sides are marked with four irregular blackish lines or stripes; that nearest to the fore extremity is horizontal, the others oblique and with a tendency to join with the other black markings above mentioned.

An adult male was found under a stone at Jerusalem, and an immature female in a similar situation at Jericho. I also found an adult male at Alexandria (Egypt) in 1864, and have received it from Spain.

GNAPHOSA EXCERPTA, sp. nov. (Plate XV. fig. 4.)

Male adult, length 3 lines.

This species is of ordinary form and general structure, and is very similar in size, general colour, and markings to *G. exornata* (Koch), as also to the two foregoing species; but it may be distinguished from all by the structure of the palpi and palpal organs, as well as by other specific characters.

The *cephalothorax* has the sides much depressed near its margins; it is yellow-brown marked with strong blackish-brown converging lines following the directions of the normal grooves and indentations; its margins are black, and the surface (especially of the caput) is pretty densely clothed with mixed yellowish and greyish pubescence, the colour of that which clothes a broad marginal band being whitish grey. The *eyes* are normal in their position, except that the hinder row appears to be rather straighter than in some other species; those of the hind central pair are (each of them) almost contiguous to the hind lateral on its side. The *legs* are rather long, their relative length 4, 1, 2, 3, moderately strong, furnished with hairs, fine bristles, and (on those of the fourth pair) with a few fine spines; they are of a dull yellowish-brown hue.

The *palpi* are short, and similar to the legs in colour: the radial and cubital joints are of equal length; the former has a kind of group of long strong bristles on its inner side, and a not very long, but strong, apophysis from its extremity towards the outer side; this apophysis curves a little upwards; and its extremity, which, looked at from one point of view, is broad and obtuse, is from another point sharply hooked backwards; the palpal organs are neither very prominent nor complex. The falces, maxillæ, labium, and sternum, which have, neither of them, any thing particularly noticeable in their structure, are of a dark yellow-brown colour.

The *abdomen* is of an oblong-oval form, very slightly broadest at its hinder extremity; it projects considerably over the base of the cephalothorax, and is of a dull yellow-brown colour, clothed with mixed greyish, yellowish, and blackish hairs and pubescence, with indistinct traces of a pattern similar to that in the species above alluded to: there are also numerous closely grouped black recurved bristles beneath the fore extremity of the abdomen: the spinners of the inferior pair are long, strong, and curved; this curvature may be accidental, but I am inclined to think it is not so; and if not, it is a good distinctive specific character; the superior spinners are small, and only half the length of those of the inferior pair.

A single example of this species (which was overlooked when the *Drassides* of the present collection were submitted to Dr. L. Koch) was found under a stone at Nazareth.

GNAPHOSA CAMBRIDGII, sp. nov. (Plate XIII. fig. 3, and Plate XV. fig. 2.)

Male adult, length 4 lines; female adult, 6 lines.

The cephalothorax, legs, falces, labium, and sternum are of a general dull reddish sandy-yellow colour, that of the abdomen being pale brownish straw-yellow. The cephalothorax is oval, very slightly compressed on the sides forwards, and margined with black-brown; the normal grooves and furrows are distinctly marked with dark blackish brown, especially those denoting the junctional line of the caput and thorax.

The *eyes* are in two transverse rows; the upper (or hinder) row nearly straight, the lower or front one considerably curved, so that the eyes of each lateral pair (as in the species of this genus in general) are widely separate; these latter are the largest, the four central eyes being smaller; the two centrals of the hinder row are rather further from each other than each is from the lateral eye on its side; the eyes of the front row are very nearly equidistant from the other. The *legs* are long, moderately strong, and well furnished with hairs, bristles, and spines; these last are most regular and numerous, though not the largest, on the tarsi; each tarsus ends with two curved, black, pectinated claws.

The *palpi* are moderately long and strong, furnished with hairs and strong bristles; the radial is rather longer than the cubital joint but not so strong; it has at its extremity on the outer side a

strong, deep-red-brown, obtusely pointed apophysis, which curves upwards and slightly over the base of the digital joint; there is also a minute red-brown tubercular prominence, near which is a long, strong, black bristle, at the extremity, on the upperside of the cubital joint; and close in front of it is another at the base, on the upperside, of the radial joint; the digital joint is large, but of ordinary form, and its length is equal to that of the radial and cubital joints together; the palpal organs are well developed, but not complex. The *falces* are moderate in length and strength, straight and conical, but prominent near their base in front. The maxillæ, labium, and sternum present no deviation from the ordinary generic type.

The *abdomen* is long-oval in form, furnished, but not thickly, with hairs, and with some strongish black recurving bristles at its fore extremity; the upperside has 4–6 conspicuous (in some examples) yellow-brown, slightly impressed spots, forming an oblong figure, but these are not very visible in other examples; it is pretty thickly spotted on the upperside with black-brown spots of various sizes, but forming a somewhat regular pattern, consisting of longitudinal and transverse lines, the former converging, the latter running off obliquely on the sides towards the spinners; these are six in number, long, slender, and very prominent; those of the inferior pair are the strongest, they are of a brightish yellow-brown colour, and nearly, if not quite, half the length of the abdomen in some examples; the rest are shorter and slenderer, but of unequal length; the spinning-tubes at the extremity of those of the inferior pair are very conspicuous; the underside of the abdomen has only the faint indications of two longitudinal slightly curved lines of dusky dots, commencing near the spiracular plates.

The *female* differs only in her shorter legs; the genital aperture is of an elongate-oblong form, constricted transversely near its middle, or in some examples towards its hinder extremity; and its margins are of a deep blackish red-brown colour.

Both sexes of this fine species were found at various places in Palestine, but most abundantly at Jerusalem and near Jericho, underneath stones and pieces of broken rock. It is an exceedingly active Spider, and very difficult to capture without injury to the legs. Its specific name is that conferred upon it by Dr. L. Koch in the MS. descriptions drawn up for his work on the *Drassides*, but the publication of which (as has been before remarked) is indefinitely delayed.

GNAPHOSA LUTATA, sp. nov. (Plate XV. fig. 7.)

Male adult, length 3 lines.

Similar in size, colour, and general structure to *G. cambridgii*, this species is of a somewhat stouter form, and may be at once distinguished by the structure of the palpi and palpal organs. The radial joint of the palpus, which is slighter, but not longer than the cubital, is bent and produced at its under and outer extremity into a long, rather slender, and very slightly tapering glossy red-brown

apophysis; this projects a little outwards, and curves gradually upwards, with an obtuse extremity; and on the outer side of this extremity there is a very small hooked, corneous, pointed continuation; the length of this apophysis is about two thirds that of the digital joint: the palpal organs are rather complex, with various corneous processes. The abdominal markings, though similar in character to those of *G. cambridgii*, are bolder and stronger, showing a longitudinal series of rather distinct yellowish chevrons on the hinder half of the upperside; these are defined by the spots, some of which are more or less confluent; the abdomen is also more thickly clothed with hairs than that of the species before mentioned.

A single example of this very distinct and easily recognizable species was captured under a stone near Beirût.

GNAPHOSA KOCHII, sp. nov. (Plate XV. fig. 6.)

Male adult, length 3½ lines.

This Spider is also very closely allied to *G. cambridgii*, from which, however, as also from *G. lutata*, the structure of the palpi at once distinguishes it. The cephalothorax, legs, palpi, and other portions of the fore part are yellow; a forked line and some other indistinct blackish markings indicate the junctional lines of the caput, thorax, and thoracic segments; there is also a fine black marginal line to the whole cephalothorax. The *eyes* are in the ordinary relative position; but the two hind centrals are of a narrow oval form, oblique, of a pearl-white colour, and contiguous to the lateral on each side respectively; the fore centrals are the smallest of the eight, and these and the laterals of the same row are near together, but equally separated. The *legs* are long and strong (their relative length 4, 1, 2, 3), and furnished with hairs and black spines, those on the hinder pair being longest and strongest; each tarsus ends with two curved pectinated claws, but no claw-tuft. The *palpi* are rather long and moderately strong; the cubital is shorter but stronger than the radial joint, and somewhat clavate at its fore extremity, which has a group of strongish bristles at the base on the upperside, a single one towards the fore extremity rather on the inner side, and some others in an oblique row on the inner side. The *radial* joint is rather produced at its extremity underneath; and from the outer side of this produced part there is a rather slender, tapering, prominent, very nearly straight, pointed apophysis, the extreme point of which is shortly but rather sharply hooked; it requires some care and accurate examination to see this hook plainly. The digital joint is rather large, and longer than the radial; it is prominent, with a red-brown margin to the prominent part at the base on the outer side. The palpal organs are well developed, prominent, and rather complex; they have a reddish, tapering, filiform spine, which, issuing from near their base on the inner side, and curving over their entire length, terminates in a fine slender point, beneath the extremity of the digital joint. There are other corneous processes and prominences; but this spine appears to be a distinguishing character of the palpal organs.

The *abdomen* is of a pale yellow colour, furnished with bristly hairs above, many of which are closely grouped, long, and recurved at the fore extremity; a long, wedge-shaped, brownish yellow marking occupies the longitudinal centre of the fore half; the anterior portion of this marking has a glossy appearance, and the whole of the upper surface is dotted with small dark yellowish-brown spots, those occupying the median line of the hinder half being symmetrical and disposed in pairs; the inferior or outer pair of spinners are large and nearly three times the length of those of the superior pair, and are similar to the legs in colour.

A single example was found beneath a stone near Ain Ata, under the Lebanon range. It was confused with examples of the next species (*G. conspersa*) by Dr. Koch in his examination; its distinctness, however, is very decided, and I have great pleasure in conferring upon it the name of that distinguished arachnologist.

GNAPHOSA CONSPERSA, sp. nov. (Plate XV. fig. 5.)

Male adult, length 3 lines; female adult, 4 lines.

This species, as may be inferred from what has just been observed, is very closely allied to *G. kochii*, but it may be distinguished, not only by the different structure of the palpi and palpal organs, but also in the character of the colours and markings of the abdomen. The whole Spider is of a clearer and paler yellow; the legs are longer and slenderer; the upperside of the abdomen is whitish yellow, spotted more or less thickly with small, dull, blackish spots; a long wedge-shaped, dull, blackish marking is visible in the central line of the fore half of the upperside, following which are five or more similarly coloured angular bars or chevrons, the ends of which are confluent, and make the spaces included appear as a series of strong whitish-yellow chevrons, diminishing in size as they approach the spinners; the outer inferior spinners are strong, and double the length of those of the superior pair. The *palpi* have the cubital joint strong, and of a somewhat tumid form, armed with a strong spine-like black bristle, directed forwards from the fore margin on the upperside; the bristly hairs on the radial joint are not in a group, as in *G. kochii*, but are more dispersed over the joint; the apophysis at the outer extremity of the radial joint is stronger, less prominent, and curved, the end being hooked, but not so sharply, the hook being larger and bolder, and forming part as it were of the general curve of the apophysis; the prominence at the base on the outer side of the digital joint is stronger; and there is a small but compact group or tuft of short, strong, straight, black bristles just above it, and close to the point of the apophysis on the radial joint: I could not detect any traces of such a tuft in *G. kochii*. The palpal organs are well developed, prominent, and rather complex; they differ from those of *G. kochii* in the absence of the fine spine which in that species runs from their base over the inner side to their extremity. One example differed from *G. kochii* in having the abdomen destitute of all trace of markings, while another had the upperside with the spots so thickly spread and confluent that little was visible ex-

cept some oblong whitish-yellow markings in front, and a series of strong and similarly coloured chevrons on the hinder half.

The females, for the most part, had the abdomen almost without markings; in others they were more or less faintly traced. The genital opening is of peculiar form, but not large; it is of a small transverse kidney shape above, followed by a curved corneous rim or ridge on either side, the curves being opposed and so diverging as their lines run backwards.

Two adult males and five females were found under stones on the plains of the Jordan, near Jericho. An adult male and females, with immature examples of both sexes, were also found in a similar situation close to the pyramids of Ghizeh, near Cairo, Egypt, in 1864.

GNAPHOSA PALÆSTINA, sp. nov. (Plate XV. fig. 8.)

Female adult, length 3 lines.

The *cephalothorax* of this species is of ordinary form, and the normal grooves and indentations are indicated by blackish lines and markings; those denoting the junctional line of the caput and thorax form two longitudinal curved lines, the curves directed away from each other, and their fore extremities are immediately behind the lateral eyes of the hinder row; the cephalothorax is also strongly margined with black, and is of a brownish-yellow colour, clothed with grey pubescence. The *eyes* are in the ordinary position; but those of the hind central pair are small, and not contiguous to the laterals. The *legs* are moderately long and strong; their relative length is 4, 1, 2, 3; their colour is similar to that of the cephalothorax; and they are furnished with hairs and fine spines. The *palpi* are similar to the legs in colour, and are furnished with hairs and bristles; a long, fine, straight, tapering one of the latter issues from the upper fore margin of the cubital joint. The falces, maxillæ, labium, and sternum are all normal in character, and similar in colour to the cephalothorax. The *abdomen* is short-oval in form, and broader behind than before; it is of a dull yellowish-white colour, clothed, but not densely, with short fine hairs; six rather conspicuous deep-brown impressed spots, in three pairs, forming two opposed longitudinal curved lines, occupy the fore half of the upperside; and between these is a longish wedge-shaped brown marking; following this are 5–6 angular brown bars or chevrons in a longitudinal series; the rest of the upperside, as well as the sides, are marked with irregular brown markings and striations; on the underside are two nearly parallel brown lines along its centre. The spinners of the inferior and superior pairs are of equal strength; but the former are double the length of the latter. The genital aperture is subtriangular, constricted towards the upper angle, and with a strong septum dividing it longitudinally; this septum tapers a little towards its point, which is directed backwards.

A single adult female was found under a stone near Tiberias.

Genus Drassus (Walck.).

Drassus lapidicolens, Walck. Ins. Apt. i. p. 598.

Both sexes, adult and immature, were found in various localities throughout the country, but nowhere in any abundance. The examples were some of them much larger than the examples I have usually found in England.

Drassus troglodytes, Koch, Die Arachn. vi. p. 35, pl. 189. figs. 455, 456=*D. clavator*, Cambr. Ann. & Mag. Nat. Hist. March 1860.

Adult examples of both sexes of this well-characterized species were found under stones occasionally throughout the country.

Drassus morosus, sp. nov. (Plate XV. fig. 9.)

Male adult, length $2\frac{1}{4}$ lines.

This Spider is of ordinary form, and is nearly allied to *D. troglodytes*, but may at once be distinguished both by the structure of the palpi and palpal organs and by the pattern on the abdomen. The whole of the fore part (including the legs and palpi) is of a pale yellow colour; but as the Spider had evidently not long since undergone its final moult, probably its general colouring would have been, in a short time, darker. The *eyes* of the hinder row are equidistant from each other, those of the central pair being oval and placed obliquely; those of each lateral pair are removed from each other by about an eye's diameter; those of the fore central pair are further from each other than each is from the lateral on its side. The *legs* are rather long and strong, particularly those of the first pair; their relative length is 1, 4, 2, 3; they are clothed sparingly with hairs and a few fine spines.

The *palpi* are short and strong; the radial is equal in length to the cubital joint; the former is produced at its fore extremity into a strong tapering apophysis, which, when looked at from in front, is indented towards its extremity on the inner side, and slightly hollow on the outer side; its extremity is obliquely but rather roundly truncated on the inner side; the digital joint is large and oval in form, and as long as the radial and cubital joints together, including the apophysis of the former: the palpal organs are prominent, but not very complex, with some small spiny corneous prominences towards their extremity. The *falces* are long, strong, and projecting, and very prominent at their base in front. The abdomen is of an oblong-oval form and of a dull brownish-yellow-grey colour, thickly marked on the sides and above with short black striæ, black suffusions, and with several sharply angular black bars or chevrons on the hinder part of the upperside; taking, however, the *black* portions as the ground-colour, there are six rather conspicuous yellow-grey blotches visible on the fore part of the upperside, in three pairs, or two longitudinal curved lines, the curves directed towards each other; those of the hinder pair are the largest, and are situated about one third of the length of the abdomen from the spinners;

following these blotches are 2–3 yellow-grey transverse angular bars, and a large somewhat triangular patch of the same immediately above the spinners, bearing broken traces of short angular black bars; on the outer side of each of the hindermost of the six above-mentioned blotches, and a little forwards, is a larger one of the same colour, followed behind by another smaller one, each being produced backwards in an oblique yellowish lateral line or stripe; the under-side has three parallel longitudinal blackish stripes, the central one being the strongest, but tapering towards its hinder extremity. The spinners are neither very long nor strong; those of the superior and inferior pairs are of equal length and strength; the spiracular plates are yellowish, and the space between them is a dark yellowish brown.

An adult male and an immature male and female were found at Jerusalem under stones.

Drassus lutescens, Koch, Die Arachn. vi. p. 21, pl. 186. fig. 445.

An adult male of this species was found beneath a stone on the shores of the sea of Galilee, near Tiberias. The male of this species is described and its palpal organs figured in 'Die Arachn. Fam. der Drass.' p. 120, pl. v. figs. 75, 76, by Dr. L. Koch.

Drassus tenerrimus, sp. nov. (Plate XV. fig. 10.)

Male adult, length 1½ line.

This small species has the cephalothorax and falces of a clear pale yellow colour, but of ordinary form, the former showing the faintest possible dusky converging lines; the whole of the rest of the Spider is a pale whitish yellow, the abdomen marked with a small, dusky, central, longitudinal, pointed bar on the fore part of the upperside, followed by some roundish spots of the same hue. The *eyes* are in two transverse rows; the foremost one (looked at from behind) is nearly straight, the hinder one rather strongly curved, bringing the laterals into contiguity with the laterals of the front row; the interval between the hind centrals is greater than that between each of these and the hind lateral on its side; the fore centrals are unusually large, and convex, by far the largest of the eight, and each touches the lateral on its side; they are seated on a large and conspicuous black patch, and are of a dark brown colour, the rest being pearly white with black margins. The *legs* are long and slender; their relative length 4, 1, 2, 3, and very sparingly furnished with hairs and a few fine black spines. The *palpi* are long and slender: the radial and cubital joints are of about equal length and strength; the former has a small, red-brown, tapering, pointed apophysis at its fore extremity towards the outer side. This apophysis curves very slightly upwards near its point. The digital joint is large, and its fore extremity rather produced; the palpal organs are well developed and rather prominent and complex, with corneous spines and processes.

An adult male was found under a stone on the plains of the Jordan, and another in a similar situation at Hasbeiya; the large size and colour of the fore central eyes, with the black patch on which

they are seated, are a remarkable and very distinguishing character of the species.

DRASSUS MUNDULUS, sp. nov. (Plate XV. fig. 11.)

Female adult, length 2¼ lines.

The whole of the fore part of this Spider, which is of ordinary form and structure, is of a deep yellow-brown colour. The *cephalothorax* is clothed with a short, yellowish pubescence. The *abdomen* is broad oblong-oval in form, and of a dark blackish-brown colour, clothed with a somewhat golden-tinged pubescence. The *eyes* of the hind central pair are oval and near together, but not contiguous; those of each lateral pair are wide apart, but nearer together than those of the hind and fore central pairs; those of the fore central pair are rather large, and each is contiguous to the lateral of the same row on its side, but they are separate, though not very widely, from each other. The *legs* are short and strong, their relative length 4, 1, 2, 3, and furnished with hairs, and on those of the two hinder pairs are a few spines. The *falces* are strong, prominent at their base in front; and their upper surface is transversely, but not strongly, rugulose. The *maxillæ* are curved over the labium, and are transversely impressed in the middle. The *sternum* is thickly set with minute punctures, from which fine hairs appear to issue; the genital aperture is small, and arched over longitudinally by a sort of duplex red-brown septum, which diverges on either side at the hinder extremity; but, like this portion of most female Spiders, no mere description can possibly give an accurate idea of its form and structure; this can only be done by a carefully drawn and magnified sketch of that part.

Of this Spider, which is allied to *D. sericeus* (Bl.), but is much smaller and of quite a different colour, an adult female was taken under a stone on the road from Jerusalem to Nazareth, and another in a similar situation on the plains of the Jordan.

An adult male and female were found at Cairo among débris of an old wall, in 1864. The male resembles the female in colour; but the abdomen had the appearance of being thickly marked above with long, closely set, longitudinal, wavy striæ, of a deep blackish brown on a dull yellow-brown ground-colour, except in the central line of the hinder part, where they are shorter and transverse; the fore extremity of the upperside is occupied by a somewhat quadrate, coriaceous, bare and shining red-brown patch, which is narrowest behind; succeeding this are three pairs of yellowish impressed spots, with a red-brown point in the centre of each; those of the middle pair are nearer together than those of the other pairs; and the hinder pair is much further from the second than the second pair is from the first; and the six spots thus form two longitudinal curved lines, the curves of which are directed towards each other. The *palpi* (of the male) are moderately long and strong; the radial is shorter than the cubital joint, and is furnished at its outer extremity with a small, red-brown, pointed and rather prominent, corneous apophysis; the digital joint is large and of a pointed oval form; the palpal organs

are well developed, and from a strong circular prominence at the hinder part they emit a long, rather slender, red-brown filiform spine, which curves round their base, but free from the surface, and along their outer side, and after a sharpish indenture, has its extreme point (including some portion of the spine itself) in contact with a longish, strong, corneous process, which issues from near the middle of the palpal organs, and has a direction parallel with, but free from, the outer margin of the digital joint.

These Egyptian examples, although undoubtedly of the same species as those found in Palestine, were larger, measuring $3\frac{1}{4}$ lines in length.

Drassus dalmatensis, L. Koch, Die Arachn. Fam. der Drassid. p. 89, pl. iv. fig. 59.

An adult female of this species was found under a stone at Damascus.

Drassus lacertosus, sp. nov. (Plate XV. fig. 12.)

Male adult, length $5\frac{1}{3}$ lines.

This fine and remarkable species is allied to *D. lapidicolens* (Walck.), but may be easily distinguished by strong differences in some parts of the structural detail. The whole Spider is of a pale yellowish colour, the abdomen being also tinged with dusky drab, and thinly clothed with fine hairs (both on the cephalothorax and abdomen) of a pale colour and somewhat silky nature. The *cephalothorax* has the caput broad and truncate in front, and its upper surface more convex and rounded than in *D. lapidicolens*. The *eyes* are small, of a pearl-white margined with black, and placed in two nearly parallel transverse rows; the four central eyes form a square; those of each lateral pair are placed obliquely, and are nearly, if not quite, as widely separated from each other as those of the fore and hind central pairs; those of the latter are nearer together than each is to the lateral of the same row on its side; while the four of the front row are separated from each other by equal spaces. The *legs* are moderately long and strong; their relative length 4, 1, 2, 3; and they are furnished sparingly with hairs and spines; the tarsi and metatarsi of the first and second pairs, and the tarsi of the third and fourth, have a double, parallel, longitudinal series of short, strong, black, close-set bristles; these spread outwards on either side; those on the tarsi are the densest, and are confluent with the ordinary claw-tuft.

The *palpi* are long and strong: the humeral joint is long and unusually strong, being equal in length to the cubital and radial together, and stouter than the femora of the first pair of legs; it enlarges gradually from its base to the extremity, near which, on the upperside, is a short, transverse row of three short, strong, somewhat tooth-like and slightly curved black spines, the outer spine being much shorter than the inner one, and the length of the middle one intermediate between them: the radial joint is long and cylindrical, half as long again as the cubital, but not so strong, and is destitute of any prominence or apophysis: the digital joint is small, and of a

narrow elongate-oval form; it is about half the length of the radial joint, and has a few short spiny bristles near its margins: the palpal organs are small, consisting of an oval, slightly convex, corneous lobe from which a small black spine issues at the extremity on the inner side, and a small, dark-coloured, corneous prominence at the outer extremity, being very much like those of *D. lapidicolens*. The *falces* are long, strong, a little prominent at their base in front, and project very slightly forwards. The maxillæ are very strong; they are straight but enlarged at their extremities, which are somewhat rounded, and inclined towards the labium, strongly impressed obliquely across their middle portion, and very prominent, or gibbous, at their base. The labium is of a somewhat oblong form, but wider in the middle than either at its base or apex, which last is truncate; these parts, as also the margins of the sternum, have some erect black bristly hairs upon them. The *abdomen* is oval, and projects a good deal over the base of the cephalothorax; the spinners are rather long and cylindrical in form, those of the superior and inferior pairs being of equal length.

A single adult male of this very distinct *Drassus* was found under a stone at Jerusalem.

DRASSUS SENILIS, sp. nov. (Plate XV. fig. 13.)

Female adult, length $3\frac{3}{4}$ lines.

This Spider is allied to *D. mundulus* (*suprà*, p. 234), as well as to *D. sericeus* (Bl.); it is of ordinary form and structure. The *cephalothorax* is of a dark bright red-brown, clothed pretty densely with a fine, greyish-white, silken pubescence, among which are a few slender, bristly black hairs.

The *eyes* are in two slightly and equally curved rows, those of the lateral pairs being brought nearer to each other than the two fore centrals are from the two hind centrals; these form a rectangle whose transverse diameter is the shortest; the fore centrals are the largest of the eight, and each is contiguous to the lateral on its side; the intervals between the eyes of the hinder row are equal. The *legs* are strong, not very long, their relative length 4, 1, 2, 3, and of a yellow-brown colour; those of the first and second pairs are the darkest, especially the tibiæ, tarsi, and metatarsi; they are furnished with hairs, and (chiefly on the third and fourth pairs) with spines; the tarsi and metatarsi of the first and second pairs, with the tarsi of the third pair, have a double longitudinal series of short, bristly, divergent hairs (perhaps the tarsi of the fourth pair had been denuded of similar hairs?). The *abdomen* is oval, truncate before and broadest behind; it projects a good deal over the base of the cephalothorax, and is of a dull brownish-yellow colour, thickly clothed with blackish and grey hairs, most of which are of a somewhat silky nature; there is a strong black-brown stripe, broader behind than before, on the upperside in the central line of the fore part; and the space immediately round this shows the yellowish ground-colour more distinctly than the rest of the surrounding surface; the underside is less thickly clothed with hairs than the upper, and shows two fine, dusky, brownish, longitudinal and nearly parallel lines along its centre.

The genital opening is very small, of an oval form, with deep-blackish red-brown margins, and placed near the centre of a somewhat heart-shaped, slightly convex, reddish yellow-brown, glossy plate or scale.

An adult female was found under a stone on the plains of the Jordan, and another (in 1864) in a similar situation near Alexandria (Egypt); in this last example the surface of the abdomen surrounding the dark stripe on its fore side was no freer from hairs than the rest.

DRASSUS INVALIDUS, sp. nov. (Plate XV. fig. 14.)

Male adult, length $2\frac{1}{2}$ lines.

This species is very similar in form and general structure to *D. lapidicolens* (Walck.), but differs in colour and markings, and especially in the structure of the palpi and palpal organs; it is also nearly allied to *D. morosus* (*suprà*, p. 232).

The *cephalothorax* is of a yellow-brown colour tinged with red-brown before. The *legs* and *palpi* are yellow, the falces, maxillæ, labium, and sternum reddish yellow-brown; the abdomen is dusky whitish brown. The *eyes* (looked at from behind) are in two parallel rows, rather more widely removed from each other than usual; the fore central eyes are further from each other than each is from the lateral on its side; the hind centrals are oval, oblique, and near together, but not contiguous, while at the same time they are much further removed from the laterals of the same row than from each other; the eyes of each lateral pair are separated by a space equal to that which separates each hind central eye from the lateral on its side, or from the fore central opposite to it. The *legs* are moderate in length and strength, their relative length 1, 4, 2, 3, and furnished with hairs and a few spines on the tibiæ and metatarsi of the third and fourth pairs. The *falces* are strong, straight, and project a good deal forwards.

The *palpi* are rather slender, but moderate in length: the radial and cubital joints are of about equal length; the former has a not very long, nor strong, rather tapering and pointed apophysis at its fore extremity on the outer side; the digital joint is rather large and of an oval form; the palpal organs are well developed, having a strong and somewhat furcate, corneous, red-brown appearance at their fore extremity; the maxillæ are strong, inclined to the labium and enlarged and rounded at their extremities, but the transverse impression is slight. The abdomen is oval, narrower behind than before; it is of a dusky hue, showing a series of paler angular bars, or chevrons, on the hinder part, near the spinners.

A single example was found under a stone on the plains of the Jordan.

DRASSUS NANUS, sp. nov. (Plate XV. fig. 15.)

Female adult, length $1\frac{1}{2}$–$1\frac{3}{4}$ line.

This small species has the cephalothorax yellow, tinged with yellow-brown, and margined with a black line. The *legs* and *palpi* are rather paler, except the four last joints of the first pair, which

are strongly suffused with black, as are also (though slightly) the corresponding joints of the second pair.

The whole Spider is of ordinary form and structure, and appears to be allied to *Melanophora electa* and *M. pumila* (Koch). The *eyes* are in two nearly parallel curved rows, the curves directed forwards; those of the front row are very close to each other; the laterals, which are larger than the centrals (if not the largest of the eight) are contiguous to them, while they (the centrals) are but slightly removed from each other; the interval between the eyes of the hind central pair is greater than that between each of them and the hind lateral on its side; the eyes of each lateral pair are obliquely placed and removed from each other by about one half of an eye's diameter. The *legs* are short and strong, especially those of the first pair, and the femora of all the legs; they are tolerably thickly furnished with hairs; and there are a few longish spines on the tibiæ and metatarsi of the two hinder pairs. The *maxillæ* are strong, but of ordinary form, a little curved, and inclined to the *labium*, which is oblong, and rounded at the apex. The *falces* are small, moderately strong, straight, subconical, and nearly vertical. The *abdomen* is of an oblong-oval form and of a pale dusky brown colour, with a strong tuft of black recurving bristles beneath the fore margin; a largish marking of a long wedge-shape, and of a darker colour than the rest of the abdomen, occupies the median line of the fore half on the upperside; and on either side of this is a longitudinal, curved row of several small, pale reddish-brown, narrow, elongated spots, the curves directed inwards; the underside is of a pale whitish yellow. The spinners are pale yellow, those of the inferior pair are longer and stronger than those of the superior. The genital aperture is small, apparently transverse, and divided longitudinally by a narrow, arched, corneous kind of septum.

Adult females of this species were found under stones near Jericho and at Jerusalem.

DRASSUS INFUMATUS, sp. nov. (Plate XV. fig. 16.)

Male adult, length 3 lines; female adult, length $3\frac{1}{4}$ to $4\frac{1}{2}$ lines.

This Spider is closely allied to *D. lapidicolens* (Walck.), which it resembles both in general form, structure, and colour; but it is much smaller, and its caput is, perhaps, narrower; the legs also are shorter and stronger, and the *palpi* also shorter; the radial joint is slightly shorter than the cubital, and has a rather prominent but small sharp-pointed red-brown spiny apophysis at its extremity on the outer side; the digital joint is small, but as long as the radial and cubital joints together, and larger in proportion than that of *D. lapidicolens*; the palpal organs are small, consisting of a somewhat circular corneous lobe, with a small black curved spine on its inner side, the sharp point directed forwards, and a similar but shorter one on the inner side, but more prominent; the fine pale needle-like point of the latter directed rather backwards and downwards; the transverse impression of the maxillæ is stronger than in the species before mentioned, and their extremities are not so dilated; the *eyes* also of the hind central

pair are rather wider apart in comparison with the rest; and the ocular area is less extended.

The female resembles the male, and the genital aperture is very similar to that of *D. lapidicolens*, ♀, though a difference is observable on comparison, which is yet difficult to give by a description.

An adult male was found under a stone on the plains of the Jordan; and an adult of each sex in an old ruined mud wall near Cairo, Egypt, in 1864.

DRASSUS SCRUTATUS, sp. nov. (Plate XV. fig. 16*a*.)

Male adult, length 3¾ lines; female adult, length 4½ lines.

This Spider is of ordinary form and general structure. The *cephalothorax* is of the deepest black-brown colour tinged with red. The *eyes* are small and not easy to be well seen; they are in two rather short transverse nearly straight, parallel rows; looked at from in front the foremost row is curved, the curve directed upwards; the eyes of each lateral pair are as far from each other as those of the fore central pair are from those of the hind central pair; these latter are oval, oblique, and each is very near (almost contiguous) to the lateral nearest to it of the same row; the eyes of the foremost row are very near, but apparently not quite contiguous to, each other. The *legs* are strong and moderately long, their relative length 4, 1, 2, 3, and they are furnished with hairs, and a few spines on the tibiæ and metatarsi of the two hinder pairs; their colour is dark black-brown tinged with greenish, the tarsi and metatarsi being paler, and of a dark yellowish brown. The *palpi* are short and of a deep blackish-brown colour; the radial joint is shorter than the cubital, and has a not very large, pointed apophysis at its outer extremity, its inner extremity being also rather spreading or prominent; the digital joint is large and oval, longer than the radial and cubital joints together; the palpal organs are well-developed and moderately complex, with closely compacted corneous spines and prominences, a portion of which, towards their extremity on the outer side, is quite white, the rest being black and red-brown. The *falces* are rather long and strong; they are prominent at their base in front, and project forwards. The *maxillæ* are exceedingly strong at the insertion of the palpi, and their transverse impression is strong and oblique. The *sternum* is glossy and thickly dotted with minute punctures; these parts, with the labium, are of a deep brown tinged with yellowish. The *abdomen* is of a rather narrow oblong-oval form and of a deep black colour tinged with green, and is slightly hairy; the spinners are long, strong, and prominent; those of the inferior pair are longer than those of the superior. The female resembles the male in colours and general characters.

Adults of both sexes were found under stones on the plains of the Jordan.

DRASSUS OMISSUS, sp. nov. (Plate XV. fig. 17.)

Female adult, length 3¼ lines.

The general structure and form of this Spider is of ordinary cha-

racter. The *cephalothorax* is of a pale yellow-brown, deepening on the caput and clypeus; the junctional lines of the caput, thorax, and thoracic segments are indicated by dark converging lines. The *eyes* are not very unequal in size, and are tolerably closely grouped together; those of the hind central pair are oblique, oval, and nearer to each other than each is to the lateral on its side; the front row is a little shorter than the hinder one, and the eyes of its central pair are further from each other than each is from the lateral on its side; those of each lateral pair are separated by an interval of less than the diameter of the hinder one. The *legs* are rather short, but moderately strong; they are furnished with hairs and a few fine spines; their colour is yellow, those of the first and second pairs are a little suffused with yellow-brown. The *palpi* are yellow-brown in colour. The *falces* moderately long, strong, prominent at the base in front and a little projecting; their colour is deep red-brown. The *maxillæ* are of normal form and of a dark yellowish red-brown colour, but lighter in hue than the falces. The *labium* is similar to the maxillæ in colour, of oblong form, rounded at the apex; and the sternum is yellow-brown. The *abdomen* is of an oblong-oval form, and its colour dull yellowish; on the upperside is a largish dusky brown elongate wedge-shaped marking in the central longitudinal line of the fore part; this is followed, towards the spinners, by a series of indistinct but broadish angular lines of the same hue. The genital aperture is of a distinct and characteristic form, being a rather large and somewhat circular opening with a longitudinal septum whose margins are strongly angular; and below this are two round boss-like glossy but slight prominences.

A single adult female was found under a stone at Hebron.

DRASSUS UNICOLOR, sp. nov. (Plate XV. fig. 18.)

Female adult, length $2\frac{1}{2}$ lines.

The whole of the fore part of this Spider is yellow, the cephalothorax being rather darker than the legs, and clothed with fine greyish hairs. The *cephalothorax* is of ordinary form but rather narrow in front. The *eyes* are in two curved rows, the curves directed backwards; the hinder row is more strongly curved than the front one; the eyes of the hind central pair, which appear to be the largest of the eight, are separated by a slightly less interval than that between each and the lateral eye on its side; the interval between the fore centrals is greater than that between each and the fore lateral on its side, from which it is separated by a very small space; the intervals between the eyes of the hind central and those of the fore central pair are equal, but are less than that which separates each of the former from the fore central opposite to it. The *legs* are rather short but tolerably strong; their colour is yellow and they are furnished with hairs, and a few spines on those of the two hinder pairs. The *falces* are small, vertical, and not prominent in front. The *maxillæ* are of normal form, and are strongly inclined to the labium. The *sternum* is oval, pointed behind; and its colour is yellow, narrowly margined with red-brown; and it is a little indented between the basal joints of

the legs, as well as thickly dotted with minute punctures. The *abdomen* is of an oval form and of a washed-out drab-yellow colour; the genital aperture is small and of characteristic form, not easy to be described, but better seen in the figure given (Pl. XV. fig. 18).

A single adult female of this Spider was found under a stone on the Lebanon.

Genus MELANOPHORA (Koch).

MELANOPHORA LÆTA, sp. nov. (Plate XV. fig. 19.)

Male adult, length $2\frac{1}{2}$ lines.

The *cephalothorax* of this species (which is of ordinary form and structure) is of a yellowish red-brown colour (in one example suffused slightly with dusky black). The *eyes* are rather compactly grouped in two transverse nearly straight parallel lines, of which the foremost is the shortest; those of the hind central pair are oval, and further from each other than each is from the lateral on its side; the position also of the fore centrals with respect to the fore laterals is similar; and these last are the largest of the eight, and each of them with the hind lateral and hind central on its side form an isosceles triangle, of which the hind lateral eye is the apex. The *legs* are moderate in length and strength, and are of a yellow-brown colour more or less suffused with dusky black; they are furnished with hairs and, on the tibiæ and metatarsi of the third and fourth pairs, a few spines; the terminal tarsal claws of the legs of the fourth pair are longer than those of the other legs.

The *palpi* are similar in colour to the legs, and short; the radial joint is very short, not exceeding one-half of the length of the cubital joint, and it has a small slightly tapering, but not sharply pointed, apophysis from its outer extremity; the digital joint is large, considerably exceeding in length that of the radial and cubital together; the palpal organs are well-developed but not very complex, consisting of some closely compacted whitish and red-brown corneous processes. The *falces* are moderate in length and strength; they project forwards and are very prominent, and indeed rather abruptly humped near their base in front, and the humped portion is furnished with longish black curved bristles. The *maxillæ* are strong and broad at the insertion of the palpi, also curved and inclined to the labium, and transversely impressed. The *labium* appeared to be of peculiar form, having the appearance of an elongate triangular piece, around the upper half of which another portion spreads out equally on all sides in a somewhat quadrate form.

The *abdomen* is small and of an oblong-oval form; it is of a dark sooty-black colour, pretty thickly clothed with short silky hairs; on the fore margin is a largish semicircular (the curve directed forwards) coriaceous yellow-brown patch, indistinctly visible. The spinners are moderately strong, long, and prominent; those of the inferior pair are the longest and strongest; the underside of the abdomen is paler than the upperside.

An immature female differed only in being larger and more brightly coloured.

An adult male was found on the plains of the Jordan, and an immature female at Jerusalem, under stones; also, in 1864, an adult and an immature male with an immature female at Cairo; this last adult male, however, was much smaller, and (as were also all the Egyptian examples) of a darker colour than those found in Palestine.

MELANOPHORA PICINA, sp. nov. (Plate XVI. fig. 20.)

Female adult, length 4 lines.

This species is larger than *M. læta*, which it resembles so exceedingly closely in form and structure, that, but for Dr. Koch's opinion, I should have hesitated to separate it from that species; its colours, however, are darker, the cephalothorax, legs, and other fore parts being deep brown tinged with yellowish, and the legs also with a blackish dusky hue; the sternum is thickly marked with small punctures; and there is no trace of a coriaceous yellow-brown patch on the fore margin of the abdomen. The *labium* is of the same form as that of *M. læta*. The genital aperture is not large; it is of a somewhat subtriangular form covered by a sort of flap of a blunt-angled diamond-shape; in front of each fore corner of the aperture is a rather conspicuous round, glossy, corneous kind of boss, of a reddish-yellow colour.

An adult female of this species was found under a stone on the plains of the Jordan—and another in a similar situation near Alexandria, Egypt, in 1864.

MELANOPHORA CARBONARIA, sp. nov. (Plate XVI. fig. 21.)

Male adult, length 2 lines.

This Spider is of a deep black colour, except the legs, palpi, falces, maxillæ, and labium, which are of a more or less deep yellow-brown. In form and structure it is of the ordinary type. The *eyes* are in the usual position; but the hind centrals being placed obliquely, they appear to be nearer than usual to the fore laterals; those of the hinder row are close to each other though about equally separated; and the same appears to be the case in regard to the eyes of the front row, which, however, is very slightly shorter than the hinder one, but curved upwards when looked at from in front. The *legs* are strong and rather long; their relative length is 4, 1, 2, 3; and they are furnished with hairs and a few spines on the tibiæ and metatarsi of the two hinder pairs; the tarsi and metatarsi are much paler than the rest of the legs.

The *palpi* are short and strong; the radial joint is equal in length to the cubital, and has a strong and somewhat tapering apophysis from its outer extremity; this apophysis curves upwards and bends a very little inwards near its extremity, which is not pointed but rather dilated, and with the appearance, when looked at in one position, of being slightly emarginate or bifid; the digital joint is rather large; the palpal organs well-developed and prominent, consisting of several corneous processes; and a slender, curved, sharp-pointed spine issues from their outer side and curves round in rather close contact with them to their fore extremity.

The *abdomen* is small and of an oblong-oval form; it is black, with a large glossy coriaceous patch on the fore margin of a deep black-brown hue, and of a somewhat subtriangular form; the apex of this patch is directed backwards and extends to very nearly one-half the length of the abdomen. The spinners are black; those of the inferior pair are long and strong, those of the superior very short.

A single example of this very distinct species was found under a stone on the plains of the Jordan.

MELANOPHORA TRAGICA, sp. nov. (Plate XVI. fig. 22.)

Male adult, length 3 lines.

The general form and structure of this Spider is of the ordinary type; but the *cephalothorax* is rather narrower before than in some other species; it is of a deep rich red-brown colour, with indistinct converging veiny-looking black lines on the sides. The *eyes* are closely grouped in the ordinary position of two nearly, or quite, parallel straight lines; the foremost line is slightly the shortest; the eyes of each line appeared to be equally separated from each other; those of the hind central pair are smaller than the laterals of the same row, and of an oblong form. The *legs* are short and strong; their relative length 4, 1, 2, 3; and they are rather lighter-coloured than the cephalothorax; they are furnished with hairs and, on the tibiæ and metatarsi (principally the latter) of the two hinder pairs, with a few spines.

The *palpi* are moderate in length and strength; the radial is shorter than the cubital joint, and has its outer extremity produced into a not very long apophysis; this is broad and strong at its commencement, but at about the middle of its length from the underside it goes off abruptly into a tapering sharp-pointed form on the upper-side, with a rather upward direction (the palpus must be viewed with the Spider held in profile in order to see this conformation of the radial joint); the digital joint is large, and the palpal organs well-developed; but these are not very complex, and their corneous processes are closely compacted. The *maxillæ* are transversely impressed, curved, and inclined to the labium; these parts are similar to the legs in colour, the maxillæ being tipped with pale whitish yellow. The *sternum* is of a bright reddish yellow-brown colour, densely marked with exceedingly minute punctures.

The *abdomen* is of an oblong-oval form and rather large, being broader behind than before; it is of a sooty-brown colour, and has a large, somewhat semicircular, coriaceous patch on its fore margin, of a colour similar to that of the cephalothorax, but with a strong shining coppery tinge; the underside is paler than the upper. The spinners are of the ordinary character; those of the superior pair are smaller and shorter than those of the inferior.

A single example of the adult male was found under a stone on the plains of the Jordan.

MELANOPHORA HELVOLA, sp. nov. (Plate XVI. fig. 23.)

Male adult, length $1\frac{3}{4}$ line.

This small species is of a uniform pale luteous yellow colour, the abdomen being paler than the rest. In form and general structure it is of the ordinary type, but the position of the *eyes* rather different; they are in a compact and rather small group, disposed in two transverse curved rows, the curves directed away from each other. The hinder row is the longest and the most curved; the eyes of the hind central pair are the largest of the eight, and of a rather oval form, oblique, and slightly nearer together than each is to the lateral on its side; those of the fore central pair are rather further from each other than each is from the fore lateral on its side; those of each lateral pair are very near to each other, but not contiguous. The *legs* are strong, but not very long; they are sparingly furnished with hairs, and (chiefly on the tibiæ and metatarsi of the hinder pair) with some blackish spines. The *palpi* are moderately long and strong; the radial joint is a little shorter than the cubital, and is slightly produced at its outer extremity into a small and not very sharp-pointed apophysis; the digital joint is of moderate size; and the palpal organs are rather prominent, not complex, and have a strong curved corneous process, or spiny projection, issuing from near their base on the inner side; this process curves round, and has its sharp point near their outer extremity. The *falces* are a little prominent at their base in front, but not very long nor very strong. The *maxillæ* and *labium* are of normal form. The *abdomen* is oblong-oval, rather broader behind than before. The spinners are strong and prominent, those of the inferior pair being stronger and a little longer than those of the superior.

A single example of the adult male of this Spider was found under a stone on the plains of the Jordan.

MELANOPHORA SCUTATA, sp. nov. (Plate XVI. fig. 24.)

Male adult, length 3½ lines.

The whole of the fore part, including the legs and palpi, is of a deep brown colour, tinged slightly with yellow; but the legs get paler towards their extremities, the tarsi of those of the third and fourth pairs being of a pale dull yellowish hue; the colour of the abdomen is a dull sooty black, and that of the spinners, which are prominent (those of the inferior pair being longest and much the strongest), is black-brown; the spiracular plates are strong and of large size, somewhat quadrate in form, and of a coriaceous nature, covered with minute impressed points or punctures, and of a dull yellow-brown colour.

In general form and structure this Spider is of the ordinary type; but the *cephalothorax* is broad, and truncate before, and scarcely at all constricted on the sides forwards. The *falces* are long, strong, and projecting, and prominent in front near their base; the *maxillæ* are very strong at their lower half, the palpi springing from nearer their extremity than their base; the *labium* is broad-oblong, somewhat curved outwards on the sides; it has its centre, in a longitudinal line, prominent, and presents the peculiarity (noticed in respect of *M. læta*, p. 241, and observable in others of this genus) of a kind

of flange or depressed margin, which runs round the sides and apex; the labium as well as the maxillæ and sternum have their surface punctuose.

The *legs* are furnished with longish, prominent, dark hairs and bristles, and some strongish spines on the tibiæ and metatarsi of those of the third and fourth pairs; their relative length appeared to be 1, 4, 3, 2; but the difference between 1 and 4 is very slight.

The *eyes* are in two, almost straight, nearly parallel transverse lines, of which the foremost is the shortest; they are small and closely grouped together; the interval between those of the hind central pair is greater than that which separates each from the lateral of the same row on its side; and a similar remark applies to the eyes of the foremost line, the interval, however, between the fore centrals being *proportionally* greater, though *actually* nearly the same as that between the hind centrals; the fore laterals appeared to be the largest of the eight.

The *palpi* are moderate in length and strength; the radial is shorter than the cubital joint, and has a small, not very sharp-pointed tapering apophysis from its outer extremity, adhering rather closely to the digital joint; this latter joint is large, oval, and its length about equals that of the humeral joint; the palpal organs are well developed, but not very complex, and, though characteristic in structure, do not present any remarkable feature.

A single adult male under a stone near Jericho.

MELANOPHORA URSINA, sp. nov. (Plate XVI. fig. 25.)

Female adult, length $3\frac{3}{4}$ lines.

Of the ordinary general form and structure, this Spider has the *cephalothorax* of a dark yellow-brown colour, with a narrow black margin, and slight converging black lines and markings, which indicate the normal grooves and indentations. The *eyes* are closely grouped in two transverse, nearly straight, parallel rows, the foremost row being slightly the shortest; those of the hinder row appeared to be separated by equal though very slight intervals; but of the foremost row the centrals are further from each other than each is from the lateral on its side. The *legs* are strong and moderately long, their relative length 4, 1, 2, 3; they are furnished with hairs, and with a few rather fine spines on the tibiæ and metatarsi of the two hinder pairs. The *falces* are similar to the cephalothorax in colour; they are neither long nor very strong, and are but very slightly prominent at their base in front; their outer surface is clothed pretty densely with short, strong, black bristles; the maxillæ are not very long, but moderately strong; their transverse impression is strong, and they are curved and inclined to the labium, which is oblong, and rather rounded at its apex. The *sternum* is covered with minute punctures; these parts are of a yellow-brown colour. The *abdomen* is of a short oblong-oval form, and of a dull sooty brown-black colour above, clothed with short fine hairs, but it is paler on the underside; below the fore margin are some short, strongish, bristly black hairs, which curve upwards; about the middle of the upperside are six small pale

and rather elongate spots, in two opposed curves (the curves directed inwards), or in three pairs, of which the intermediate pair are much nearer to the fore than to the hinder pair. The spinners are strong and prominent, those of the inferior pair being the longest and strongest. The genital aperture is of a subtriangular form, with two circular reddish-brown corneous-looking glossy bosses within the triangle at its base.

Two adult females were found under stones on the plains of the Jordan.

MELANOPHORA INAURATA, sp. nov. (Plate XVI. fig. 26.)

Male adult, length 3 lines; female adult, 3 to 3½ lines.

The general form and structure of this species is of the ordinary type; but the upper part of the caput is rather more convex than usual. The *cephalothorax* is of a very deep rich black chestnut-brown colour, and its surface quite bare (perhaps denuded?), and thickly covered with minute impressed marks and punctures. The *eyes* are in two transverse, nearly straight and parallel rows; the hind centrals are smaller than the laterals, and separated from each other by a wider space than each is from the hind lateral on its side; the fore centrals are the smallest of the eight, and are rather further from each other than each is from the fore lateral on its side, the fore laterals being apparently the largest of the eight. The *legs* are moderate in length and strength (their relative length 4, 1, 2, 3), and are furnished with fine hairs, and a few spines on the metatarsi and tibiæ of the third and fourth pairs; they are similar in colour to the cephalothorax, except the tarsi and metatarsi, which are of a pale yellow-brown. The *palpi* are moderately long and strong; the radial is shorter than the cubital joint, and has a small slightly tapering but not very sharp-pointed red-brown apophysis at its extremity on the outer side, which adheres closely to the side of the digital joint; this joint is moderate in size; and the palpal organs are well developed but not very complex; the corneous processes are white, black, and red-brown, and are rather compactly fitted together. The *falces* are similar in colour to the cephalothorax, strong, very prominent at their base in front, and furnished pretty thickly with black bristles. The *maxillæ* and *labium* are of a rich chestnut-brown colour, and are normal in size and form: the maxillæ are tipped with yellowish; they have a strong transverse impression, and are strongly curved and inclined to the *labium*, which is perceptibly convex along the middle. The *sternum* is lighter-coloured, and is thickly covered with punctures. The *abdomen* is of an oblong-oval form, a little broader behind; its upperside is of a dark sooty colour, and is thickly clothed with short fine hairs, which in some lights have a somewhat dull greenish golden hue; the underside is dull pale yellow-brown, with two fine longitudinal, central, dark impressed lines. The spinners are small and prominent; those of the superior pair are shorter by half a length than those of the inferior. The female resembles the male.

An adult male was found under a stone at Nain, and an adult

example of each sex in a similar situation near Alexandria (Egypt) in 1864.

MELANOPHORA PEDESTRIS, Koch, Die Arachn. vi. p. 82, pl. 200. fig. 489.

An adult male of this species (which is not rare in Europe generally, and has also been found in England) was found under a stone at Nain.

MELANOPHORA CAUCASIA, L. Koch, Die Arachn. Fam. der Drassid. p. 144, pl. 6. fig. 87. (Plate XVI. fig. 27.)

An adult male and female were found in company with *M. pedestris* at Nain.

MELANOPHORA GRACILLIMA, sp. nov. (Plate XVI. fig. 28.)

Male adult, length 1½ line.

This mall but very distinct species is of the ordinary general form and structure. The *cephalothorax* is glossy, and of a deep rich black chestnut-brown colour. The *eyes* are rather closely grouped, in two transverse, nearly straight, parallel rows; those of the hind central pair are slightly nearer to each other than each is to the hind lateral on its side, while the fore centrals are further from each other than each is from the fore lateral on its side, to which it is, in fact, almost, if not quite, contiguous; all the eyes, except those of the fore central pair, are pearly white. The *legs* are strong and rather long (their relative length 4, 1, 2, 3), especially those of the first pair; their colour is yellow, the genual, tibial, and metatarsal joints of all except those of the third pair being more or less suffused with black-brown; the legs are furnished with hairs and (principally on the metatarsi and tibiæ of the third and fourth pairs) a few spines. The *palpi* are neither long nor very strong; the cubital is longer than the radial joint, and has a sharp-pointed red-brown apophysis from its fore extremity, rather on the outer side; the radial joint is emarginate at its upper fore margin; the digital joint is rather large; and the palpal organs are very prominent; from a somewhat circular lobe at their hinder part there issues, from the outer side, a black filiform spine, which curves over them to the inner side, and thence round the inner margin to their extremity; the lobe from which this spine issues has also a small dark corneous prominent point at its hinder part. The *abdomen* is short, and of an oblong-oval form, broader behind than before; its colour is black, and the upper surface of its fore half is almost entirely occupied by a large, somewhat oval, shining coriaceous integument, of a deep rich black chestnut-brown colour. The *female* resembles the male in colour, but is a little larger, and is without the shining coriaceous patch on the abdomen.

Examples of both sexes were found under stones on the plains of the Jordan. The apophysis from the *cubital* joint is, as far as I am aware, a unique character in this genus, if not in this family.

MELANOPHORA CARMELI, sp. nov. (Plate XVI. fig. 29.)

Male adult, length $2\frac{1}{2}$ lines.

This species, whose general form and structure is of the usual type, differs from all known to me in having the legs, which are of a yellow-brown colour, broadly annulated with black-brown (the femora and tibiæ of the male, however, being entirely black or black-brown). The *cephalothorax* is of a deep black-brown colour. The *legs* are long, their relative length 4, 1, 2, 3, rather strong, and furnished with hairs and a few spines. The *palpi* are moderately long, and not very strong; the radial is equal to the cubital joint in length, and has a small sharp-pointed red-brown corneous apophysis from its extremity on the outer side; the digital joint is rather small, and the palpal organs are neither very prominent nor complex, but there is a rather closely coiled, filiform, red-brown and black spine at their extremity. The *maxillæ* are normal; the *labium* large, oblong, and rounded at its apex: these parts, with the sternum, which is thickly marked with impressed punctures, are of a dark yellow-brown, the maxillæ tipped with pale whitish. The *abdomen* is of a narrow oblong-oval form and a dark sooty-black colour, and has a bare, but not shining, coriaceous patch on the fore part of the upperside; the spinners are of moderate size. A female was much smaller (although quite adult) than the male, but resembled the male in colour and markings. The genital aperture is of characteristic form.

Two adult males and one female were found under stones on Mount Carmel, near El Mŭkrakah, the supposed place of Elijah's sacrifice.

Genus MICARIA (Westr.).

MICARIA IGNEA, sp. nov. (Plate XVI. fig. 30.)

Female adult, length $1\frac{1}{2}$ line.

The *cephalothorax* is of a narrow oval form, and, when looked at in profile, curves slightly but regularly from the hinder margin to the eyes; it is of a bright and rather coppery-red colour, clothed with a few yellowish hairs. The *eyes* are in two almost concentric curved rows, the curves directed backwards; those of the foremost row are larger than those of the hinder one; the centrals are the largest of the eight, and are separated by a very narrow interval, while each is contiguous to the lateral on its side; the hind centrals are further from each other than each is from the hind lateral on its side, the interval between them being equal to that between the two lateral eyes, and the interval between the hind centrals is equal to that between each and the fore lateral on its side. The *legs* are slender, those of the hinder pair being much the longest; their relative length is (apparently) 4, 1, 2, 3; and their colour is yellowish, clouded with reddish yellow and red-brown; they are furnished sparingly with hairs and a few short fine spines. The *falces* are vertical, and neither long nor very strong; they are similar in colour to the cephalothorax. The *abdomen* is long and narrow, and of a somewhat cylindrical form;

it is joined to the cephalothorax by a short but distinct pedicle; the fore half is of a dull yellowish colour, tinged with red, the hinder part black; the whole is furnished with scaly hairs, reflecting green and golden metallic tints. A broken transverse line or bar of white hairs indicates the junction of the black and yellow portions; the abdomen is slightly constricted at this part, chiefly by a depression across the upperside; the underside is similar to the upper, except that the black and yellow portions run into each other gradually. The genital aperture is small and indistinct, but characteristic in form. The *maxillæ*, *labium*, and *sternum* are similar in colour to the cephalothorax.

Examples of the female, both adult and immature, were found under stones beneath the walls of Jerusalem, between the Damascus and St. Stephen's gates. They were exceedingly active, and so very similar to the numerous ants inhabiting the same places, as to make their capture very difficult; the adult males (of which I saw several) escaped, owing to this cause. In the search for this Spider I met with the only molestation that occurred to me during the whole tour in Palestine,—several natives appearing to think it a good opportunity to stone me from the walls, obliging me to beat as quick and as dignified a retreat as might be practicable under the circumstances.

MICARIA TRIFASCIATA, sp. nov. (Plate XVI. fig. 31.)

Female adult, length 3 lines.

This fine and distinctly marked species is of ordinary general form and structure. The *cephalothorax* is of a deep chestnut-brown colour, clothed thinly (chiefly on the sides and caput) with short greyish-white hairs. The *eyes* are not so closely grouped as in most of the Spiders of this genus: the hinder row is straight; and its central eyes are small, oval, very oblique, and separated by about double the interval which separates each of them from the hind lateral on its side; the foremost row is much shorter than the hinder one, and is a little curved, the curve directed forwards; the eyes of this row appear to be larger than those of the hinder row, and the interval between those of its central pair is greater than that which separates each from the fore lateral on its side; this lateral eye and the central of the same row on its side appeared indeed to be nearly, if not quite, contiguous to each other; the four central eyes form very nearly a square, whose foremost side is the shortest. The *legs* are moderate in length and strength, their relative length 4, 1, 2, 3, and their colour yellow-brown, with the femora and a portion of the femoral and tibial joints of the two hinder pairs dark blackish brown, giving them a somewhat annulate appearance; the legs of the first and second pairs are rather darker than the rest. The *falces* are rather small and vertical, and, with the sternum (which is of an oval shape), similar to the cephalothorax in colour. The *abdomen* is oblong-oval, and black, with a broadish transverse band (somewhat emarginate on its hinder edge) of white hairs on the fore margin; another similar transverse band (but broader and interrupted in the middle) crosses the abdomen just before the central line; this band fines off just at

the underside of the abdomen on each side; and on either side of the extremity of the abdomen, near the spinners, is a conspicuous spot formed by white hairs; the spinners are rather long and prominent, those of the inferior pair are a little longer and stronger than those of the superior pair.

But for Dr. Koch's opinion, I should have been inclined to refer this species to the genus *Drassus* or *Melanophora*. A single example was found under a stone at Haifa.

MICARIA SEPTEMPUNCTATA, sp. nov. (Plate XVI. fig. 32.)

Female adult, $1\frac{1}{3}$ line.

This small but brilliant Spider may be distinguished from *Drassus* (*Micaria*) *nitens* (Bl.)=*M. pulicaria* (Westr.), which in form, colour, and structure it nearly resembles, by being smaller, and by having the white hairs on the cephalothorax (which is of the deepest black-brown colour) generally but thinly dispersed over the surface, not gathered into converging lines as in *M. pulicaria*; some of these hairs reflect metallic tints like those on the *abdomen*, which is black and covered with scaly hairs reflecting metallic tints of gold, green, and purple. The *abdomen* has also, on the upperside, seven small but distinct white spots, formed by groups of short white squamous hairs; two of these spots are on the fore margin, four others form a transverse row about one third of the length of the abdomen, behind the two first, and the seventh is at the hinder extremity, just above the spinners; on either side of the fore extremity, but rather beneath it, is also a short oblique stripe of similar white hairs. The *legs*, which are not very long nor greatly different in length (but whose exact relative length I could not satisfactorily ascertain), are of a yellow colour, except the femora, which are black.

An adult female was found under stones on an old wall at Hasbeiya.

Since writing the above description I find an adult male (hitherto overlooked) from a similar habitat, on the Lebanon, near Ain-Ata. In colours and markings it resembles the female, but it is rather smaller. The *palpi* are short, and of a black-brown colour; the radial and cubital joints are of equal length, and the former has a small, pale, prominent, pointed apophysis from its outer extremity; the digital joint is narrow, no broader than the radial, but equal to that and the cubital together in length; the palpal organs are prominent, but simple in structure. The *legs* of the male are also longer than those of the female; their relative length is 4, 1, 2, 3.

MICARIA NUPTIALIS, sp. nov. (Plate XVI. fig. 33.)

Male adult, length $2\frac{1}{2}$ lines; female adult, $2\frac{3}{4}$ to 3 lines.

This fine species has the *cephalothorax* long and narrow, and of a deep black-brown colour, clothed with greyish-white hairs, some of which are drawn into converging lines, indicating the ordinary indentations on the thoracic portion. The *eyes* are very small, and apparently of nearly equal size; they are disposed in two transverse concentrically curved rows, the foremost row being the shortest; the

interval between the central eyes of each row is greater than that between each and the lateral of the same row on its side, to which last it is exceedingly near, though not contiguous. The *legs* are long and rather slender; their relative length is 4, 1, 2, 3 in the male (but not in the female); and those of the fourth pair are much the longest; they are furnished with hairs and (those of the third and fourth pairs) a few small spines; the colour of the first and second pairs is yellow, with blackish-brown femora, that of the third and fourth pairs dark yellow-brown, deepening to black-brown on the femora. The *palpi* are long, and of a deep blackish-brown colour; the cubital, radial, and digital joints are long and of nearly equal length; the radial joint is perhaps slightly longer than the cubital, and has a rather strong and prominent apophysis, with a sharp and slightly curved point; the palpal organs are simple, and have a very small but strongly curved reddish spine at their fore extremity, near which is another small corneous process. The *falces* are long and strong, a little prominent at their base in front, and inclined backwards towards the *maxillæ*; these last are unusually prominent or gibbous at their base, but otherwise of normal structure. These parts, with the *labium* and *sternum* (which latter is heart-shaped), are similar to the cephalothorax in colour; but the maxillæ are tipped with yellowish. The *abdomen* is of a narrow elongate-oval form, strongly constricted transversely at the middle of the upperside; its colour is jet-black, clothed sparingly with squamous hairs, which emit green and purplish metallic tints; a small spot of brilliant white hairs is on either side near the fore margin; and also on either side, in the transverse constriction, is a white stripe of the same nature, running over to the underside. The *female* resembles the male; but the abdomen has no transverse constriction, and the spots on the fore margin are in this sex strong stripes; the stripes at the middle are also stronger than in the male.

An adult male and female of this handsome and very active Spider were found under stones at Hebron, and another adult female in a similar situation near Jericho.

MICARIA ALBIMANA, sp. nov. (Plate XVI. fig. 34.)

Female adult, length $2\frac{1}{4}$ lines.

This species is allied to *M. nuptialis*, which it resembles in form, general structure, and colours; but it may be readily distinguished by its yellower brown cephalothorax and other fore parts; the palpi also have the humeral joints blackish, but the rest is of a clear pale yellowish white; the legs are likewise paler than those of *M. nuptialis*; and the sternum is clothed with coarsish grey hairs. The abdomen is black, but richer and more metallic in its tints; a stripe (which is interrupted in the middle) formed by pure white hairs encircles the fore margin; a transverse row of five strong spots or markings runs over the sides and upperside at about the middle; and there is a small white spot just above the spinners; the underside is paler than the upper, and has a short longitudinal tapering white stripe about the middle; the genital aperture is rather large, and somewhat of a

T-shape; from indications in the only example found it seems probable that in some examples the two lateral spots of the middle abdominal row would be found to become confluent, and so form a continuous stripe.

A single adult female was found under a stone at Nain.

Genus Phrurolithus (Koch).

Phrurolithus flavipes, sp. nov. (Plate XVI. fig. 35.)

Female adult, length 1½ line.

In general form and structure this species is of the usual type, but may be easily distinguished by its colours and markings. The *cephalothorax* is of a brownish-yellow colour, marked and streaked obscurely with brown, and clothed with greyish-white hairs, some of which are disposed in converging lines on the sides. The *eyes* are in two transverse and very nearly straight rows, well separated from each other; the front row, when looked at from the front, curves a little upwards; the interval between those of the hind central pair is slightly greater than that between each and the lateral of the same row on its side; each of those of the fore central pair is contiguous to the fore lateral on its side. The *legs* are moderately long and strong, their relative length 4, 1, 2, 3; those of the fourth pair considerably exceed in length those of the first pair; they are of a brightish yellow colour, with the femora darker; those of the first and second pairs are nearly black. A double longitudinal series of long and rather strong sessile spines occupies the undersides of the tibiæ and metatarsi of these two pairs.

The *falces*, *labium*, and *maxillæ* are yellowish, clouded with dusky black; and the *sternum* is of a blackish-brown colour.

The *abdomen* is oval, and of moderate size and convexity; its colour is black, with four yellowish-white spots forming a large quadrangular figure on the fore half of its upperside; the foremost side of this figure is shorter than the hinder one, following, in fact, the width of the abdomen at those two points.

An adult female was found at Hasbeiya, under stones, on an old wall, and another in a similar situation on Mount Lebanon.

Genus Clubiona (Latr.).

Clubiona straminea, sp. nov. (Plate XVI. fig. 38.)

Male adult, length rather more than 2½ lines.

This Spider is entirely of a straw-yellow colour, the cephalothorax, however, being tinged with dusky reddish; and the abdomen has a space along the middle of the fore half of the upperside of a brighter yellow than the rest; the extremity also near the spinners is slightly suffused with red-brown. In general form and structure this species approaches *Clubiona deinognatha* (Cambr.)=*C. phragmitis* (Koch). The *eyes* are rather large, but not very different in their relative size, and are in the ordinary position; the foremost row is placed immediately above the falces, almost on the margin of

the clypeus, and is straight; but the hinder row is a little curved; the two centrals of this row are nearer together than each is to the lateral of the same row on its side, while the hind centrals are further from each other than each is from the lateral on its side; the eyes of each lateral pair are placed in a strongly oblique line, and the interval between them exceeds one half an eye's diameter.

The *legs* are moderately long, and not very strong; they are sparingly clothed with hairs and spines.

The *palpi* are rather slender and moderately long; the humeral joints have two short, strong, black bristles near their fore extremity; the cubital is longer than the radial joint, and has a long black bristle issuing from its fore extremity; the latter joint has two longer black bristles on its inner side; and at its outer extremity there is a small blunt pointed apophysis, with a small red-brown corneous prominence at its base on the underside; the digital joint is small, and of an oblong-oval form; the palpal organs are simple, and not very prominent, though well developed. The *falces* are long, strong, and projecting; their profile is slightly arched, and they are broadly but not deeply excavated near their inner extremities; their colour is a dark reddish yellow-brown.

The *abdomen* is of a long-oval form, pointed behind; its colour is yellow, very sparingly clothed with greyish-yellow hairs; it has the normal narrow elongate marking along the centre of its fore half very indistinctly visible, being only of a little clearer and darker yellow than the rest; four dusky-yellow impressed spots form nearly a square (the fore side being slightly the shortest) not far from the middle of the upperside. The spinners are prominent, but of moderate length and strength, those of the inferior pair being longer and stronger than those of the superior.

A single adult male was found among the low plants near Elisha's Well, on the plains of the Jordan.

CLUBIONA GILVA, sp. nov. (Plate XVI. fig. 39.)

Female adult, length 3 lines.

This Spider might be taken for the female of *C. straminea*; but the *eyes* are smaller, and are disposed in two longer and more nearly parallel lines, the fore one of which is not quite so near to the margin of the clypeus as in that species: their relative positions, however, are the same; but the interval between those of each lateral pair equals, if it does not exceed, the diameter of the largest of them. The *falces* are stronger and more arched in profile; they are also without any excavation on their inner sides at the extremities (but this may be only a sexual character), and are of a deep reddish yellow-brown colour; in other respects this species is similar in colour to *C. straminea*, but the abdomen has a few small prominent black bristles on its upperside at and near the fore extremity. The *maxillæ* and *labium* are of the ordinary form, the latter is slightly emarginate at its apex (as also is that of *C. straminea*); the genital aperture is very small, and very similar in form to that of *C. phragmitis* (Koch), to which, perhaps, this Spider is still more nearly allied than to *C. stra-*

minea; it differs, however, from the former remarkably in colours, no example, out of the numerous examples of *C. phragmitis* that I have seen, having the pale unicolorous abdomen of the present species.

A single adult female among water-weeds, near Elisha's Well, Jericho.

CLUBIONA CONTAMINATA, sp. nov. (Plate XVI. fig. 40.)

Female adult, length $2\frac{1}{2}$ lines.

This species is nearly allied to the foregoing, but is smaller; and the cephalothorax is more depressed; it is of a bright brownish-yellow colour, a little darker in front, and with a narrow pale margin. The *eyes* are small, but not greatly different in size, and are in the ordinary position; those of the front row (which is much shorter than the hinder row) are equally separated from each other; those of the hind central pair are considerably further from each other than each is from the lateral of the same row on its side. The *legs* are not very long, except those of the fourth pair, which are considerably the longest; their relative length appeared to be 4, 1, 2, 3; but of this I am not certain, owing to a difficulty in the actual measurement. The *palpi* are short and, with the *legs*, are yellow, the latter being furnished with hairs and spines. The *falces* are strong, but not very long; they are nearly vertical and very prominent towards their base in front, where they have numerous black bristles. The *maxillæ* appeared to be much more enlarged than usual near their extremities on the outer side, where they are of a bluntish angular form; in other respects they are quite normal. The *labium* is oblong, and rather rounded at the apex. The colour of the falces is deep reddish yellow-brown; that of the maxillæ and labium paler; and the *sternum* is yellow. The abdomen is oval, and of a pale yellow colour; about the middle of the upperside is an elongate dark red-brown stripe, indicating the hinder portion of the usual median stripe on the fore side; on the sides of and behind this stripe are numerous short dark red-brown markings and striæ; these are most frequent on the sides near the spinners. The genital aperture consists of a very small and somewhat horseshoe-shaped opening, above which are two deep-blackish red-brown spots or markings in a transverse line.

Two adult females were found among weeds on the banks of the stream flowing from Elisha's Well, near Jericho.

CLUBIONA ACCENTUATA (Walck.), Ins. Apt. tom. i. p. 594.

An adult female of this species was found at Jerusalem.

Genus CHEIRACANTHIUM (Koch).

CHEIRACANTHIUM ANNULIPES, sp. nov. (Plate XVI. fig. 36.)

Female adult, length nearly 3 lines.

This Spider is of the ordinary form and structure, but may be easily distinguished by its colours and markings. The *cephalothorax* is

yellow, furnished thinly with greyish-yellow hairs. The *eyes* are in two transverse rows; the fore one is straight, and nearly an eye's diameter from the margin of the clypeus; those of the hind central pair are nearer to each other than each is to the lateral of the same row on its side; those of the front row appeared to be equidistant from each other; the four central eyes form a square, and those of each lateral pair are placed obliquely, and are contiguous to each other. The *legs* are moderately long, and not very strong; their relative length 1, 4, 3, 2; their colour is yellow, with a broken red-brown annulus at each joint, and they are furnished very sparingly with hairs and a few short spines. The *palpi* are short, and, with the maxillæ, are yellow. The *labium* is dark blackish brown, with a yellow margin. The *sternum* is yellow, with a marginal row of largish and nearly confluent deep-blackish red-brown spots or blotches.

The *abdomen* is oval, and very convex above; it is of a dull dusky yellowish colour, thickly spotted with whitish-yellow cretaceous-looking spots, upon which are numerous black spots and markings, both on the upper- and underside; the normal elongate longitudinal marking in the middle of the fore part is of a barbed form; the other black markings form, on the hinder half, two longitudinal lines of strong spots, which converge as they approach the spinners, while those on the sides form irregular oblique line. The *falces* are long, strong, and straight, and a little projecting.

Three females (adult and immature) were found among low-growing prickly plants on the waste between Mount Tabor and Nazareth.

Cheiracanthium tenuissimum, L. Koch, Die Arachn. Fam. der Drassid. p. 237, pl. ix. fig. 154.

An adult male of this species was found at Hebron, another at Jerusalem, and an adult female on the road from the latter city to Nazareth.

Cheiracanthium seidlitzii, L. Koch, Die Arachn. Fam. der Drassid. p. 264, pl. x. figs. 169–171.

An adult female at Beirût.

Cheiracanthium mildei, L. Koch, Die Arachn. Fam. der Drassid. p. 253, pl. x. figs. 161–163.

An adult male of this very distinct species was found on low-growing plants on the plains of the Jordan, and another afterwards at Corfu.

Cheiracanthium anceps, sp. nov. (Plate XVI. fig. 37.)

Female adult, length 3 to 3½ lines.

The general form and structure of this species is of the ordinary type. The whole of the fore part (except the falces, which are long, strong, and straight, a little prominent, and of a yellow-brown colour) is dull yellow, furnished with yellowish hairs. The *eyes* are small,

not very unequal in size, and margined with black; they are in two transverse rows, the hinder one of which is curved away from the front row; the eyes of this last (which is a little the shortest) are equidistant from each other, as are also those of the hinder row; those of each lateral pair are near to each other, but not quite contiguous. The *legs* are long and rather slender (their relative length 1, 4, 2, 3), and they are furnished with hairs and a very few spines; these last are chiefly on the legs of the third and fourth pairs. The *palpi* are rather long and slender. The *maxillæ* and *labium* are of a light yellow-brown colour. The *abdomen* is oval, and projects considerably over the base of the cephalothorax; it is of a dull yellow-brown colour, clothed with yellow-grey hairs, and mottled thickly with clearer yellow cretaceous-looking spots; these are brightest and most conspicuous in the immediate vicinity of the normal elongate longitudinal marking on the fore half of the upperside, this marking, of a dark dull brown colour and well defined, having a bold subangular prominent point at its middle on either side, and a smaller one between that and its fore extremity; its hinder extremity ends in a point. On the underside the cretaceous spots are thick and conspicuous. Probably in life the abdomen was of a greenish hue; but of this I have no certain recollection.

In two other examples, which Dr. Koch considers to be of the same species, the abdomen was of a clearer bright yellow (in the cabinet specimens), and, except a few near the normal elongate marking on the fore part of the upperside, there were no cretaceous spots either above or below; and this normal marking was paler and less well defined. Perhaps the cretaceous spots are dependent on age and the consequent cracking as it were of the epidermis after the deposition of ova.

CHEIRACANTHIUM PELASGICUM, Koch, Die Arachn. Fam. der Drassid. p. 243, pl. x. fig. 156.

Adults of both sexes of this fine and handsome Spider, which is allied to *C. nutrix*, but very distinct, were found on low-growing plants at Jerusalem.

Genus TRACHELAS (L. Koch).

TRACHELAS MINOR, sp. nov. (Plate XVI. fig. 41.)

Female adult, length not quite 1½ line.

Cephalothorax oval, with the profile-line of the caput and thorax level; but the caput is well defined by the ordinary oblique lateral indentation; it is of a bright yellowish-red colour, very sparingly clothed with hairs; the whole is thickly covered with minute impressed dots or punctures; and the hind slope is rather abrupt. The *eyes* are rather large, but not very different in their relative size; they are in two very nearly concentrically curved transverse rows (the fore one of which is the shortest), and close to each other, but not contiguous; the interval between those of the fore central pair is greater than that between each and the fore lateral on its side, with

which it is very nearly contiguous; the fore centrals are only an eye's diameter from the margin of the clypeus; the hind centrals are further from each other than each is from the hind lateral on its side; and there is a roundish black patch immediately below and contiguous to the fore central eyes. The *legs* are short and moderately strong; their relative length 4, 1, 2, 3, and their colour a clear pale yellow; they are furnished sparingly with hairs, but are quite destitute of spines. The *palpi* are short, and similar in colour to the legs. The *falces* are short, strong, and a little inclined backwards, and similar to the cephalothorax in colour. The *maxillæ* are of a yellow-brown colour, the extreme margin being pale; they are strong, of nearly oblong form, slightly broadest at the extremities, which are a very little rounded, and rather inclined to the *labium*. This part is large, much the broadest at its base, and the sides rather rounding to the apex, which is truncate; its colour is dark yellow-brown, and the apex pale yellowish. The *sternum* is heart-shaped, of a reddish-yellow colour, and, like the cephalothorax, covered with punctures. The *abdomen* is of oval shape, considerably convex above, and projects over the base of the cephalothorax; it is of a pale yellow hue, the upperside more or less suffused above with purplish or maroon-brown, principally on the hinder part, where, in the central line near the spinners, are several indistinct yellowish angular lines or chevrons. The genital aperture is characteristic.

An adult female was found under a stone at Jericho; one was also received subsequently from France. Figure 41, *a*, *b*, Plate XVI. represents the male palpus, drawn by Dr. Koch from a French example, of which, not having seen it, I am unable to give any description.

Genus Hecaërge (Bl.).

Hecaërge maculata, sp. nov.

Female immature, length 3 lines.

The whole of this Spider (which is of the ordinary form and structure) is of a yellowish colour, the abdomen being of rather a duller hue than the rest; the upper surface (including the legs also) is thinly spotted and marked with small dull brown spots and markings. The *eyes* are in two transverse curved rows, the hinder one being rather the longest, and the curves directed forwards; the hinder row is more strongly curved than the other, so that the interval between the two lateral eyes on either side is greater than that between each hind central eye and the fore central opposite to it. The eyes of the fore central pair are the smallest of the eight, and are slightly further from each other than each is from the lateral on its side; and the interval between the hind centrals is less than that between each and the hind lateral on its side. The legs are moderately long and strong, their relative length 4, 1, 2, 3; the tarsi and metatarsi of each of those of the first and second pairs have on their undersides two longitudinal parallel rows of long, strong, sessile spines; and each tarsus has a small compact tuft of sooty-coloured hairs at its extremity, beneath two curved black claws. It is possible that with adult

examples the spots and markings on this Spider may form a regular pattern, perhaps very similar to that of *Hecaërge spinimana*.

Two immature examples were found near Beirût, and another on the plains of the Jordan.

HECAËRGE? OPINIOSA, sp. nov. (Plate XVI. fig. 43.)

Female adult, length $2\frac{3}{4}$ lines.

The *cephalothorax* is of a short oval form, constricted laterally at the caput; its profile slopes gradually from the commencement of the hind slope to the eyes. The normal grooves and indentations are tolerably distinct; and the hind slope is abrupt and broadly impressed. The colour of the whole of the fore part of this Spider is yellow. The *eyes* are on black spots, in two transverse very slightly curved rows, near to each other, and the curves directed backwards. The interval between the eyes of the central pair of each row is greater than that between each and the lateral of the same row nearest to it; each central eye is, in fact, contiguous to the lateral next to it; the eyes of each lateral pair are close to each other, very nearly but not quite contiguous. The *legs* are moderately long and not very strong, their relative length 1, 2, 3 (those of the fourth pair were wanting); the tibiæ and metatarsi of the first and second pairs have a double longitudinal series of long sessile spines beneath them; each tarsus ends with two slender curved claws. The *falces* are moderately long and strong, a little divergent near their extremities, and their profile-line a little arched. The *maxillæ* are rather strong, straight, but inclined to the labium, and a little enlarged on their outer extremities. The labium is short and broad, rather narrower and somewhat rounded at the apex. The sternum is short, heart-shaped, and indented between the basal joints of the legs. The *abdomen* is of an elongate-oval form, and its colour is a dull whitish drab-yellow, without any markings either above or beneath. The genital aperture is narrow, chiefly marked by a transverse black-brown line of the following form, ⌣⌣.

A single example was found on the Lebanon. I have included this Spider doubtfully in the genus *Hecaërge*. It appears to be certainly a Drasside; and its general appearance, as well as the spines beneath the tibiæ and metatarsi of the first two pairs of legs, and the maxillæ, seem to connect it with *Hecaërge*; but the position of the eyes is somewhat different, and indicates a nearer approach to *Drassus*.

Genus AGRŒCA (Koch).

AGRŒCA LYCOSIFORMIS, sp. nov. (Plate XVI. fig. 42.)

Male adult, length $3\frac{3}{4}$ lines; female adult, $4\frac{1}{2}$ lines.

The *cephalothorax* is oval, much broader behind than before, where it is roundly truncated, and almost devoid of any lateral constriction; the profile line of the caput and thorax is almost uniformly level; and the normal grooves and indentations are indicated by short dark lines. It is of a dull yellow colour, clothed with paler hairs, and has two broad longitudinal dark brown bands, one on either side

of the central line; these bands run the whole length of the cephalothorax, leaving two broad yellow marginal bands, and a still broader central one which has at its fore extremity two short, fine, dark brown lines originating at the two hind central eyes, running backwards for a little way, and converging into one. The normal indentation which indicates the central junction of the caput and thorax is shown by a fine, longitudinal, bright, red brown line; this line is sometimes produced forwards and so meets the two above-mentioned converging lines.

The *eyes* are nearly equal in size, and are in two transverse rows; the front row is straight, and the curve of the hinder row is directed backwards; the eyes of each lateral pair are a little obliquely placed, and are contiguous to each other; those of the front row, which is the shortest, are about equidistant from each other, and are apparently smaller than those of the hinder row, of which the centrals are slightly nearer to each other than each is to the lateral on its side; the height of the clypeus is about equal to the diameter of one of the fore central eyes. The *legs* and *palpi* are a little deeper-coloured than the cephalothorax; the former are long and strong; their relative length 4, 1, 2, 3, and are furnished with hairs, bristles, and spines; each tarsus has a kind of scopula beneath its whole length, and terminates with two curved claws, beneath which is a strongish tuft of hairs.

The *palpi* are moderately long and strong; the humeral joint is enlarged gradually at its fore extremity, near which on the upperside it is encircled by a series of fine black spines, each end of the series being a small compact group of several black bristles: the cubital and radial joints are about equal in length; the latter is the least strong, and has numerous long bristly hairs, mostly on the underside, and it is produced at its extremity on the outer side into a short, bent, pointed, prominent, red-brown, corneous apophysis; the digital joint is large, of an oval form, and pointed at its extremity: the palpal organs are well developed and not very complex; they consist of one or two corneous lobes, from the hinder one of which towards the inner side a red-brown spine issues and curves round backwards beneath the base of the radial joint, and so round the outer margin of the digital joint, terminating near its fore extremity in a fine filiform point. The *falces* are of ordinary form and strength. The *maxillæ* are moderately long and strong; they are somewhat oblong, rounded at their extremities on the outer side, and slightly inclined to the *labium*, which is short, broad, and nearly quadrate; these parts, with the *sternum*, are similar to the cephalothorax in colour, the falces being a little darker.

The *abdomen* is of a long-oval form, and of a paler yellow than the cephalothorax; it has on its upperside two longitudinal converging brown-black bands, which appear like the continuation of the bands on the cephalothorax; near their hinder portion these two (abdominal) bands are charged with a short longitudinal series of nearly confluent and not very distinct yellowish spots; they are, however, sufficiently distinct to be a characteristic

feature; the inner edge of each band is clean and well defined, but the outer one is ragged and joins in with spots and markings on the sides; these spots are sometimes arranged in somewhat oblique lines which run backwards; within the central space left by the two longitudinal bands is a longish tapering figure defined by two blackish lines which converge to a point as they run backwards from the fore margin of the abdomen; this tapering figure is very similar to the marking found in a similar situation almost invariably in the genus *Lycosa* and in many other Spiders: the underside of the abdomen has three longitudinal broken lines of black spots—one line along the centre and a marginal one on either side. The spinners are not very long; those of the superior pair have two joints, the extreme joint bent downwards; those of the inferior pair are the strongest, and are nearly as long as the former, and of a darker colour.

The *female* resembles the male in colour and markings; the genital aperture is very small and nearly circular in form.

Adults of both sexes, as well as immature examples, were found among water-weeds on the banks of the stream leading from Elisha's Well, near Jericho. It is a very active Spider; and in its manner of running, in its form and general appearance, and in the pattern on the cephalothorax and abdomen it bears a striking resemblance to many Spiders of the genus *Lycosa*.

Fam. Palpimanides.

Genus Palpimanus (Dufour).

Palpimanus hæmatinus, Koch, Die Arachn. iii. p. 21, pl. 80. figs. 178, 179.

Adults of both sexes, as well as immature examples, were found not unfrequently under stones on the plains of the Jordan near Jericho. The spinners of this Spider are but two in number.

Fam. Dictynides.

Genus Eresus (Walck.).

Eresus acanthophilus, Duf. An. Sc. Phys. tom. vi. p. 14, pl. 95. figs. 3, 4.

Adult and immature examples of both sexes of this fine Spider were abundant in their tubular cornucopia-like webs at various places in Palestine; these webs were usually spun firmly into some thick and thorny plant. The systematic position of the genus *Eresus* has been the occasion of some difference of opinion among araneologists; for myself, I cannot perceive any close affinity in the Spiders which compose it to the Salticides with which it has usually been placed. As it appears to me, there are strong family affinities between it and *Dictyna*, both in general form and structure and mode of life, besides the possession by each of a calamistrum on the metatarsi of the fourth pair of legs and a supernumerary maxillary organ, though

the mere possession of these would not necessarily bring them into juxtaposition with each other. *Eresus* and *Dictyna* seem to me to connect the Agelenides and Drassides through *Palpimanus* and *Stenochilus* (Cambr.).

Eresus mœrens, Koch, Die Arachn. xiii. p. 3, pl. 433. fig. 1078.

A single adult female was found near Jericho.

Eresus ruficapillus, Koch, Die Arachn. xiii. p. 4, pl. 433. fig. 1080.

Adult and immature females were found also near Jericho.

Genus Dictyna (Sundeval).

Dictyna benigna, Bl. Brit. & Ir. Spid. p. 146, pl. ix. fig. 93.

A single adult female was found on low plants on the Lebanon.

Dictyna variabilis, Koch, Die Arachn. iii. p. 29, pl. 83. fig. 187.

A single adult female of this species was found at Hebron.

Dictyna consecuta, sp. nov.

Male adult, length 1 line.

This species, although smaller and differing a little in colours and markings from *D. uncinata* (Westr.), yet resembles it so nearly as to be distinguished readily only by the structure of the palpi and palpal organs. The spur at the base on the upperside of the radial joints of the *palpi* is *slightly curved and directed forwards*; *in* D. uncinata *it is straight and nearly vertical*; the digital joint is large; and the palpal organs have a strong rather circular corneous lobe near their base on the inner side, from which springs a strong black spine which completely surrounds the palpal organs in its wide and sweeping coil. The markings of the *female* are more distinct than those of the male, and give a good distinguishing character from *D. uncinata*: the central longitudinal dark marking on the fore part of the upperside of the abdomen is *distinctly trifid* at its hinder extremity; and the brown angulated lines or bars which succeed this are rather indistinct, but are terminated at either extremity by a bold and distinct black patch or spot. The female has a calamistrum on the metatarsus of each leg of the fourth pair, and also a supernumerary spinning-organ; the adult male has only the latter.

An adult male was found on low-growing plants at Jerusalem, and another near Damascus; the adult female alluded to was found in a similar situation on the plains of the Jordan.

Dictyna puta, sp. nov.

Male and female (immature), length 1 line.

In form and structure this species is similar to the last, *D. consecuta*. The *cephalothorax* is dark brown; the legs and palpi yellowish brown with a slight olive tinge; the tarsi and metatarsi of the former are pale yellowish, with a brown annulus at their extremities.

The *abdomen* is jet-black, and the whole Spider more or less thickly clothed with whitish-grey hairs; these are mostly coarse, and some of them are somewhat squamose in character. The most specially distinctive specific characters of the male, such as the form of the falces and the structure of the palpi, could not be observed, owing to the immature condition of the specimen. The female possessed calamistra and an inframamillary organ.

An example of each sex was found on low plants at Jerusalem.

DICTYNA INNOCENS, sp. nov.

Female adult, length $1\frac{3}{4}$ line.

Closely allied to *D. consecuta*, this species is larger and perhaps more nearly allied to *D. benigna* (Bl.), from which, however, it may be distinguished by its generally paler colour (having a pale yellowish ground-colour clothed with hoary pubescence) and the much greater minuteness and distinctness of the pattern on the upperside of the abdomen; the longitudinal oblong marking on the fore half is narrow and somewhat cruciform behind, resembling nearly in this respect *D. consecuta*; in some examples this marking is almost obsolete; the succeeding angular bars are black-brown, strong, and often more or less confluent, forming an almost homogeneous patch in some examples; the sides are thickly marked with black-brown; and the underside has a broad, longitudinal, central band of the same colour. The *legs* are short, of a yellowish colour, clothed with hoary hairs, and annulated with reddish brown. It has calamistra in the usual position, and an inframamillary organ.

Examples (all females) were found on low-growing plants on the plains of the Jordan.

Fam. AGELENIDES.

Genus AMAURORIUS (Koch).

AMAURORIUS PUTUS, Cambr. Zool. 1863, p. 8570.

Adult females of this Spider (which I cannot distinguish from *A. putus* = *Ciniflo puta*, Cambr.) were found on low plants on the plains of the Jordan. It is, I believe, identical with *Lethia stigmatisata* (Menge). I cannot at present distinguish the genus *Lethia* (Menge) by any good generic characters from *Ciniflo* (Bl.). The name *Amaurobius* (Koch) is adopted as being prior to that of *Ciniflo* conferred by Mr. Blackwall.

AMAURORIUS SIMPLEX, sp. nov.

Male immature, length $2\frac{1}{4}$ lines.

In general form and structure this Spider is like the typical species of the genus. The whole Spider is of a general dark sooty-black colour, the cephalothorax and falces being more or less strongly tinged with deep brown; the height of the clypeus is less than half that of the facial space. The *eyes* are not large, nor very unequal in size; the four centrals form nearly a square whose fore side is the shortest; the interval between those of the fore central pair is less

than that between each and the fore lateral on its side, but equal to that between the eyes of each lateral pair respectively; the eyes also of the hind central pair are nearer to each other than each is to the hind lateral on its side. The *legs* are paler than the rest, having somewhat of a greenish yellow-brown hue, the tarsi being much the palest. The *palpi* are short and strong; the radial joint (though, being immature, it was not fully developed, having apparently one more change of integument to undergo) was large and very spreading in front, showing symptoms of a strong but undeveloped prominence at its fore extremity rather on the inner side; the digital joint is very large and of a broad oval form; the palpal bulb was very large, prominent, and tumid.

An immature female resembled the male, and possessed calamistra and a supernumerary spinning-organ; the male had the latter but not the former. I have never observed the former on the metatarsi of any adult male examples of those species of Spiders of which the females, whether adult or immature, invariably possess them; but I have occasionally seen them on immature males of one or two species.

Two males and one female (all immature) were found at Jerusalem among the débris of an old wall.

AMAUROBIUS DISTINCTUS, sp. nov.

Male adult, length $2\frac{3}{4}$ lines; female adult $3\frac{1}{4}$.

This remarkably distinct species, although closely allied to *A. simplex*, may be at once distinguished by two longitudinal rows of pure white spots on the upperside of the abdomen, the ground-colour of which is jet-black; these rows consist each of 5–6 spots, and they converge towards each other a little as they approach the spinners; the four foremost of the spots are the largest and occupy the fore half of the upperside of the abdomen, forming a large and nearly square area; the spots which succeed are smaller, and diminish gradually in size towards the spinners. The *cephalothorax* is of a dull yellow-brown colour, narrowly margined with black. The *eyes* are very similarly situated to those of *A. simplex*, but those of the lateral pairs are rather nearer to each other. The *legs* are moderately long and strong, and are furnished with hairs and a few spines, of which latter the chief consist of a row beneath the metatarsi of the first pair, short and tooth-like; the colour of the legs is a dull brownish yellow deepening at the extremities of the joints, and thus giving them a kind of indistinctly annulate look. The *falces* are rather long, strong, similar to the cephalothorax in colour, slightly hollowed on their inner sides, and impressed near their extremities in front. The males of this species have a supernumerary spinning-organ but no calamistra; the females have both.

The *palpi* are short, strong, and similar in colour to the legs; the radial joint has some strong irregular prominences at its fore extremity; and the digital, which is large and of a somewhat oblong-oval form, has a strong, rather angular, sharp-pointed prominence at its base on the outer side; the palpal organs are highly developed and

prominent, having some large and variously formed corneous processes connected with them.

Several examples of both sexes, but the males immature, were found beneath stones and among débris of various kinds on the plains of the Jordan. In similar situations I also found examples of both sexes, both adult and immature, at Alexandria (Egypt) in 1864.

AMAUROBIUS INDISTINCTUS, sp. nov.

Female adult, length nearly $2\frac{1}{4}$ lines.

The whole of the fore part of this Spider, both above and below, is of a yellow colour, the legs and palpi being rather paler than the cephalothorax. The *legs* are neither very long nor strong; they are furnished with hairs, long bristles, and a few longish fine spines, and have calamistra on the metatarsi of the fourth pair. The *eyes* are nearly equal in size, and are more closely grouped than in either of the foregoing species; those of the foremost row are nearly equidistant from each other, the space between the two centrals being rather greater than that between each and the lateral next to it; those of the hinder row are also relatively in a similar position; those of each lateral pair are near together but not contiguous; and the four central eyes form very nearly a square. The *falces* are moderately long, strong, and considerably and roundly prominent near their base in front. The *abdomen* is oval, more than usually convex above, and bluff and rounded behind; its fore part projects over the spinners, the supernumerary one of which is apparently undivided; the colour of the abdomen is a pale yellowish whitey-brown, with a row of paler and rather oblique, short, strong, but indistinct bars along its upperside.

This obscure Spider appears to belong to the genus *Amaurobius*, though in some respects it is of rather abnormal character; it was found underneath a stone near Jericho.

AMAUROBIUS RUFICEPS, sp. nov.

Male adult, length $2\frac{1}{2}$ lines.

This Spider may be at once distinguished from its near allies (*A. simplex* and *A. distinctus*) by the colour of the cephalothorax, which is a bright yellowish red, the femora of the first two pairs of legs being also strongly tinged with the same; the remainder of the legs, as also the *falces* (which are prominent at their base in front), the *maxillæ*, *labium*, and *sternum* are of a more or less dark brown tinged with yellow; the *legs* are furnished, but not conspicuously, with hairs and fine spines; they are rather long and strong; and their relative length is 1, 4, 2, 3.

The *palpi* bear a general similarity to those of *A. distinctus*; but the radial joint has far more remarkable and irregular prominences at its extremity, and the digital joint is also larger and of a different form; it differs likewise in the structure of the palpal organs.

The abdomen is dull black with a silky hue. An inframamillary organ is present, but no calamistra.

A single adult male was found under a stone near Cana-el-Jelil.

Genus LACHESIS (Savign.).

LACHESIS PERVERSA, Savign. Arachn. d'Egypte, pl. i. fig. 4.

An adult female of this species was found under a stone on the Lebanon near Ain-Ata.

LACHESIS MEADII, sp. nov. (Plate XIII. fig. 4.)

Male adult, length $2\frac{1}{2}$ lines; female adult, 3 lines.

Cephalothorax oval, with no lateral constriction forwards, where it is bluff and rounded; the normal grooves and indentations are obsolete, except a very faint one in the middle line of the thoracic region; the caput and thorax are confluent, rounded, and arched; its colour is a deep rich, almost chocolate-, red-brown; its surface is destitute of hairs, and has a somewhat coriaceous appearance. The clypeus exceeds in height double the length of the space occupied by the two central pairs of eyes.

The *eyes* are in two strongly curved transverse and almost parallel rows, of which the curves are directed backwards; the front row is the shortest and least curved. The eyes are small and do not differ much in size; those of the two central pairs form a quadrangular figure whose fore side is the shortest; the interval between the eyes of each of these pairs is much less than that between each central eye and the lateral of the same row nearest to it; and the intervals between those of each lateral pair are about equal to that between those of the fore central pair.

The *legs* are moderate in length and strength, and their colour is orange-brown, the femora tinged with darker brown; they are furnished sparingly with fine hairs and dark spines; each tarsus ends with three claws, of which the two superior ones are strong, curved, and pectinated, the inferior one small and much inflected at its base.

The *palpi* are short, and similar in colour and armature to the legs, except the radial joint, which is of a deep rich red-brown colour, and the digital, which is of a dark yellow-brown; the radial is stronger than the cubital, and has its fore extremity on the upper-side produced into a long, strong, curved, blunt-pointed apophysis, which adheres closely to the side of the digital joint, the latter having the appearance of being indented so as to receive the apophysis, which curves downwards and rather backwards over the palpal organs; the digital joints are large, and their exterior sides are directed inwards towards each other; and besides the above-mentioned apophysis, the radial joint appears to have another short obtuse one on its under-side; the palpal organs are highly developed and complex, with various corneous lobes, spines, and processes, of a red-brown and black colour.

The *falces* are moderately long, strong, and conical, and a little inclined backwards; they are similar in colour to the cephalothorax, and are furnished with numerous bristly hairs near their inner extremities; the fang is small, and its point has a somewhat backward direction. The *maxillæ* are strong and curved over the labium, which they nearly enclose; their colour is red-brown tipped with

yellowish white. The *labium* is oblong, rounded at the apex, which is of a whitish colour, the remainder being red-brown. The *sternum* is heart-shaped and of a dark yellow-brown colour.

The *abdomen* (of the female) is oval, of a dull black colour, and very sparingly furnished with hairs; on the upperside are three pairs of yellowish-white, longish oval, oblique spots of different sizes in a longitudinal series in the middle line, giving the appearance of broken chevrons; these are succeeded by a crescent-shaped transverse patch of the same colour, and large and small somewhat triangular patches and an oval one, all arranged longitudinally in the centre line, the oval spot being immediately above the spinners; these are rather prominent and of a pale yellowish colour, those of the inferior pair being much the longest. On the underside the abdomen has a broadish broken bar of yellowish white on either side, into the posterior part of each of which there joins in a short oblique lateral stripe of the same colour; and between these two bars is a long central longitudinal line or narrower bar. The upperside of the abdomen in the male (adult) appears to be covered with a transparent, glossy, somewhat corneous integument of a shield-nature, through which a pattern similar to that on the abdomen of the female is rather indistinctly visible; the spiracular plates are of a yellowish-brown colour; and the genital aperture is deep red-brown and of an omega-form. With these differences, the two sexes are in other respects similar.

Adults of both sexes were found under stones, but very rarely, on the plains of the Jordan near the ruins of ancient Jericho.

It did not appear to be an active Spider; and I could not detect any web or snare belonging to it, though these would probably, if they existed, have been destroyed by the lifting up of the stones. I have connected with this Spider the name of my kind friend Mr. R. H. Meade of Bradford.

LACHESIS BLACKWALLI, sp. nov. (Plate XIII. fig. 5.)

Male adult, length $7\frac{1}{2}$ lines.

Cephalothorax oval, compressed laterally at the caput; it is moderately convex above, and the profile of the caput and thorax run evenly into one line; the normal grooves and indentations are fairly defined; the caput is rounded and rather bluff in front, and slopes in a somewhat circular form to the margin of the clypeus, which is very slightly impressed and exceeds in height the length of the space occupied by the fore and hind central pairs of eyes; the colour of the cephalothorax is yellow, slightly tinged with orange-brown, and thinly clothed with short fine pale hairs.

The *eyes* are in two strongly curved transverse rows, and are placed somewhat in front of the highest part of the caput; the curves are directed backwards; and the hinder row is longer than the fore one; the eyes of the fore central pair are the largest of the eight. The relative position of all the eyes is similar to that of *L. meadii*.

The *legs* are long, strong, their relative length 4, 3, 1, 2, and of a yellow colour, the tarsi and metatarsi being strongly suffused with

red-brown; they are furnished with hairs, bristles, and numerous deep black-brown spines, some of which, especially those on the tibiæ, tarsi, and metatarsi, are long and strong. Each tarsus ends with three claws; those of the superiors strong, curved, and pectinated, and the inferior one small and much bent at its base.

The *palpi* are short and similar in colour and armature to the legs; the cubital joint is somewhat nodose, and rather stouter, though shorter, than the radial, which has a long pointed apophysis at its outer extremity; this apophysis bends sharply upwards, and is in close contact with the digital joint, almost seeming as if it were grown into the digital joint; it has also a strong angular point on its lower surface; the digital joint is large and of an oval form, bent or flattened in on the outer side, and armed with some short, strong, black spines near its extremity on the upperside; the palpal organs are well developed but simple in structure, forming a slightly prominent lobe almost divided transversely near the middle by a strong constriction.

The *falces* are large, powerful; and their colour is yellow; they are densely clothed in front with short blackish hairs; the fangs are short, recurved, not very powerful, and of a deep red-brown colour. The *maxillæ* are short, strong, and curved towards the labium; the curve of their outer margin is almost that of a circle; their colour is pale yellow; and they are furnished with strong bristly prominent black hairs. The *labium* is more than half the length of the maxillæ; it is of an oblong form, rather the narrowest at its apex, which is somewhat rounded; its colour is pale yellow; and it is furnished with a few dark hairs.

The *abdomen* is rather small, of a short oval form, broadest towards the hinder extremity; and its ground-colour is yellow, furnished, but not densely, with fine hairs of a pale hue; a broad transverse bar of black-brown runs round and beneath its fore margin, and from the centre of this, and at right angles to it, a narrower bar of the same colour runs backwards for about half the length of the abdomen; this bar is strongly enlarged at about the middle into an obtusely angular point on each side; these angles are succeeded by another small one on each side; and the hinder extremity of the bar is also a little enlarged and pointed, forming a somewhat diamond-shaped termination; this bar is succeeded towards the spinners by two slightly converging rows of dark black-brown spots or short transverse bars, five in each row; the first two of these are in a line with the extreme point of the longitudinal central bar; between the two second spots is a faint indication of a third; and in a line with the large angular enlargements of the central bar, on either side, is a strong irregular lateral patch of a similar colour; and this is followed on each side, backwards, by two other much smaller patches, decreasing proportionally in size; the spinners are short.

An adult *female*, though much smaller, was evidently of this species, and had the lateral markings on the abdomen longer, as well as the inferior spinners of much greater length.

A single adult male of this fine and striking species, upon which

I have conferred, with great pleasure, the name of our veteran araneologist Mr. Blackwall, was found under a stone at Jerusalem, and a female, in a tubular silky web, among the loose broken earth of an old bank near Beirût; it is not certain whether the web belonged to this Spider, or whether it might not have been an appropriation of the labours of some other Spider.

Palæstina, nov. gen.

Characters of the genus.

Cephalothorax oblong, slightly constricted laterally forwards, moderately convex above; caput large, uniformly convex and rounded, without any impression of the clypeus. Normal grooves and indentations almost obsolete.

Eyes eight, not very unequal in size; in two transverse slightly curved rows not far removed from each other.

Falces short, strong, straight, and conical. Fang short and small.

Maxillæ rather long and strong, especially at the base; slightly enlarged at the extremities, inclined towards the labium, and slightly impressed transversely about the middle.

Labium somewhat oblong, and rather narrower at the apex than at the base.

Legs not very long or strong, nor very different in their relative length, which is 4, 1, 2, 3; terminal tarsal claws three.

Abdomen oval, moderately convex above; united to cephalothorax by a short but distinct cylindrical pedicle; spinners six, those of the inferior pair largest, two-jointed, and slightly curving upwards over the abdomen.

This genus, which, after some hesitation, I have formed for the reception of several species of minute and curious Spiders, appears to connect the genera *Lachesis* and *Enyo*. The position of the eyes is decidedly different from both, while the general form and structure is very like the former.

Palæstina dentifera, sp. nov.

Male adult, length $1\frac{1}{4}$ line.

The cephalothorax, falces, legs, maxillæ, labium, and sternum of this species are of a bright orange yellow-red, the legs being rather the lightest-coloured. The surface of the cephalothorax is roughened by small punctures, and is very sparingly furnished with hairs. The clypeus is prominent, and its margin rounded and projecting over the base of the falces; its height equals the length of the line formed by the foremost row of eyes; these are in two slightly curved and almost concentric rows (the hinder row less curved than the front one) near to each other; the centrals of the hinder row are further from each other than each is from the lateral on its side, and are the smallest of the eight, while the two fore centrals are distinctly the largest; and all except these are pearly white; the interval between the eyes of each lateral pair is equal to the diameter of the fore one. The *legs* are rather slender, and

furnished only with hairs. The *palpi* are strong and moderately long; the radial and cubital joints are about equal in length; the former is the strongest, and is enlarged and somewhat tumid on its outer extremity, from which there issues a slender spiny apophysis; this is so nearly adhering to the base of the digital joint as to make it difficult of observation: the digital (as well as the radial) joint is strongly tinged with dark blackish brown; it is large, but of ordinary form, and terminates with a slightly curved claw: the papal organs are well developed but not very complex.

The *falces* are short, strong, and furnished towards their extremities on the upper (or front) side with a small group of about five short, strongish, prominent, black, tooth-like spines.

The *abdomen* is coriaceous on the upperside, where it is of an exceedingly polished and glossy jet-black colour, and entirely destitute of hairs; a broad oblique yellowish band runs from the hinder region of each side up to the fore extremity of the abdomen, which is likewise encircled by it; the underside is of a dark chocolate-brown colour, with a broad central longitudinal pale yellow band of a somewhat elongate triangular form, which occupies its greater area; the spiracular plates are of a yellow orange-brown, and the spinners pale yellow. An adult female differed only in the less conspicuous nature of the tooth-like spines on the falces, and in the abdomen being strongly constricted towards its fore extremity over the upperside.

An adult male and female of this interesting little Spider were found on the surface of a piece of rock, on the plains of Jordan near Jericho. Although allied both to *Lachesis* and *Enyo*, it was impossible to include it under either of those generic appellations.

PALÆSTINA EXPOLITA, sp. nov. (Plate XIII. fig. 6.)

Male adult, length 1 line.

This species differs from *P. dentifera* in the colour of the cephalothorax, falces, sternum, labium, and maxillæ being deep brown, with a largish patch of a suffused blackish hue at the hinder point of junction between the caput and thorax; the clypeus also has on it a few strongish bristly hairs; and the lateral constriction is greater.

The *eyes* are of a more uniform size, and those of each lateral pair are rather nearer to each other; the *falces* have some similar tooth-like spines in front near their extremities, but of these in the present species there were, in most examples, no more than two at all conspicuous. The whole Spider is rather shorter than the former, principally perhaps from the abdomen projecting more over the base of the cephalothorax.

The *abdomen* is jet-black above, and equally polished and glossy above with *P. dentifera*; the upperside has the appearance of being covered by a distinct coriaceous case or shell.

The *legs* are of a yellowish-brown colour, suffused with deep black-brown: the radial and cubital joints of the *palpi* are yellow-brown in colour; and the former is produced at its outer extremity, where it has two to three small and not easily distinguishable points

or apophyses; the sides and underside of the abdomen are deep brown, paler in the central line of the underside. The female resembles the male.

This Spider, although very similar and nearly allied to *P. dentifera*, may easily be distinguished by the differential characters given above. Several examples of both sexes were found on the surface of rocks near Beirût. A single example was also met with at each of the following places:—Mount Carmel, Nain, and the Lebanon (Ain-Ata). When disturbed, it runs with exceeding swiftness over the face of the rocks, and conceals itself in the inequalities of their surface.

PALÆSTINA SEXOCULATA, sp. nov.

Female adult, length $1\frac{1}{4}$ line.

Very similar in size, form, and structure to the foregoing species, the present may be distinguished by a shorter and stouter make; the abdomen also projects more over the base of the cephalothorax; the whole of the fore part, including the legs, is of a bright orange-yellow colour tinged with red; the cephalothorax is minutely but thickly impressed with small punctures; the *abdomen* is of a short oval form and very convex above; the upperside is black and glossy, but not so polished or corneous-looking as in the two former species; the underside is pale yellow.

The *eyes* are only six in number; two large dark ones are seated transversely on a blackish patch, and form a central pair, on either side of which is another pair; these are quite small, those of each pair are placed at right angles to the line of the central pair, and are nearly contiguous to each other; the fore one of each of these lateral pairs is separated from the central eye nearest to it by about the length of its own diameter.

An adult female of this Spider was found at Jerusalem. It agrees with the typical species in all generic characters, except that of the number of the eyes: if this latter character be a permanent one of the species, it can yet, I think, in this instance have only a specific influence; possibly the number of the eyes may be accidental; instances are not unfrequent of an abnormal number of eyes in Spiders of different genera. The Spider itself is otherwise interesting, because it indicates in some respects a closer affinity to *Lachesis* than either *P. dentifera* or *P. expolita*, and in some others a closer affinity than these do to *Enyo*.

Genus ENYO (Savigny).

ENYO GRÆCA, Koch, Die Arachn. x. p. 83, pl. 348. fig. 811.

An adult male of this Spider was found at Nain.

ENYO LUCTUOSA, sp. nov.

Male adult, length $1\frac{1}{2}$ line.

In form and general structure this species is like *E. germanica* (Koch).

The *cephalothorax* is of a deep glossy black-brown colour, the *falces* and *sternum* being similar, but the *maxillæ* and *labium* much lighter.

The *legs* are long and slender, their relative length 4, 1, 2, 3; they are of a dull yellow colour, except the femora, which are black-brown, the tibiæ also, in some examples, being slightly suffused with the same.

The *eyes* are placed in a position similar to that of the eyes in the typical *Enyos*,—three in a short, curved, obliquely longitudinal row on either side; and transversely, between the two foremost eyes of these rows, are two other eyes; *these latter*, in the present species, are much the largest of the eight, and are further from each other than each is from the foremost eye of the other three on its side; these foremost eyes are next in size to the intermediate front ones, and each of them is nearer to the intermediate one next to it than this last is to the hindermost eye on its side, which is the smallest of the eight. The height of the clypeus considerably exceeds half the height of the facial space.

The *palpi* are short, of a deep black-brown colour, except the radial and cubital joints, which are dull yellow tinged with reddish brown; the former is the shortest, and is rather roundly prominent on its outer side, where it is strongly and obtusely produced at its extremity, this extremity being continued on its upperside by a short, strong, pointed, corneous apophysis; the digital joint is large, oval, produced, and pointed at its extremity, which terminates in a short curved black spine; the palpal organs are well developed and prominent, with a strong, curved, corneous process at their fore extremity on the outer side, and another shorter, more obtuse, and not curved, close to it on the inner side.

The *abdomen* is oval, very convex above, and projects over the base of the cephalothorax; its upperside is black, and the underside is of a somewhat vinous black hue. The female resembles the male in colour.

Adults of both sexes were found under stones on the plains of the Jordan.

ENYO ATRICEPS, sp. nov.

Male adult, length 1¼ line.

This species is rather smaller than the preceding, and, though resembling it in form and general structure, differs in various particulars: the clypeus is not so high, being no more than half the height of the facial space; the *cephalothorax* is yellow, the *caput* being of a deep reddish brown-black; the *falces* are rather lighter in colour; the *legs* yellow, the femora and tibiæ slightly suffused with brown; the *palpi* also are yellow; the radial is shorter than the cubital joint, and has a not very large blackish, red-brown, pointed, corneous spine or apophysis in continuation of its outer extremity; the digital joint is not so large in proportion as that of *E. luctuosa*, but, like that, its fore extremity terminates in a small curved black spine: the palpal organs are well developed, but not very complex;

they have two or three corneous processes in front; the strongest of these is on the outer side, and is in the form of a hook, with a sharp black spiny point.

The *abdomen* is black on the upperside, and yellowish mixed with vinous beneath; the branchial opercula are yellow.

An adult of each sex was found under a stone on the skirts of the Lebanon.

ENYO LUTIPES, sp. nov.

Male adult length $1\frac{1}{4}$ line; female adult $2\frac{3}{4}$.

This species is similar in size and general structure to *E. atriceps*; but the clypeus is higher, considerably exceeding half of the facial space. The *cephalothorax* is yellow, rather tinged with orange; the upper part of the caput is of a dull red-brown colour; the *falces* are brown; the whole of the underside of the Spider, with the legs and palpi, are clear yellow. The *legs* are long and slender; their relative length 4, 1, 2, 3. The *palpi* are moderately long and not very strong; the radial is not half the length of the cubital joint, nor so strong; it is broadly and obtusely produced on its outer extremity, the produced part terminating on its upperside in a short, strong, sharply curved, and prominent sharp-pointed spine: the palpal organs are well developed, but not very complex; they have two or three small, dark, corneous processes at their fore extremity, and are obtusely prominent behind, where, from the inner side, issues a long, filiform, black spine, which curves round their inner side beneath but quite free from the inner margin of the digital joint, its slender point curving round beneath the fore margin of the same, and terminating on the outer side of the palpal organs.

The *abdomen* is short oval, very convex above (in the female it is almost globular in form); it is of a glossy jet-black colour above, the underside and lower part of the sides yellow; the junction of the yellow and black colours is well defined and obliquely curved, following the profile-line of the abdomen.

Adults of both sexes were found under stones on the plains of the Jordan, and an adult female in a similar situation at Jerusalem.

CITHÆRON, nov. gen.

Characters of the genus.

Cephalothorax oval, constricted laterally at the caput; hind slope gradual; profile-line even.

Maxillæ oblong, strongly curved, their outline almost semicircular, inclined to the labium, and strongly, but not suddenly, impressed in a transverse direction.

Labium large, oblong, rounded at the apex and constricted about the middle.

Sternum oval, very slightly pointed behind.

Eyes eight, not greatly unequal in size; in two transverse, curved rows; the curves directed backwards; the foremost row is the most

strongly curved; the clypeus exceeds in height the length of the space occupied by the four central eyes.

Legs long, moderately strong; relative length 4, 1, 2, 3; destitute of spines, and with but very few hairs (perhaps denuded?); those on the undersides of the tarsi are squamose. Each tarsus terminates with three curved claws; the inferior one very minute; beneath these are 2–3 straighter, opposed claws.

Abdomen oval, very convex above; spinners six, those of superior pair three-jointed, the two terminal joints directed perpendicularly upwards.

This genus, which I have felt constrained to establish for the reception of two Spiders found in Palestine and Syria, appears to connect the genera *Enyo* and *Agelena*, but to be incapable of inclusion in either of them; it is also allied to the genus *Lachesis*.

CITHÆRON PRÆDONIUM, sp. nov.

Female adult, length $2\frac{1}{2}$–$3\frac{1}{2}$ lines.

The *cephalothorax* is of a dark yellow-brown colour, with a broad lateral marginal band of a clear yellow; the legs and palpi are yellow. The *eyes* of the hind central pair are oval, oblique and near together but not quite contiguous; they are much further removed from the laterals of the same row; the interval between the fore centrals (which are round and prominent) is greater than that between each and the lateral on its side, with which it is almost but not quite contiguous; the interval between those of each lateral pair is rather greater than that between either of the fore centrals and the hind central opposite to it. The *falces* are not very long, but strong, vertical, and conical in form, and prominent near their base in front; they are similar in colour to the cephalothorax; the *maxillæ* are yellow, the *labium* brownish yellow, and the *sternum* yellow, with strong marginal indentations between the basal joints of the legs.

The *abdomen* is almost destitute of hairs; it is of a uniform dark maroon-brown colour above, and yellowish beneath, with a longitudinally elongate yellow patch immediately above the spinners; the inferior spinners are blackish brown, and only half the length of those of the superior pair, which are of a paler yellowish brown, three-jointed, and turned upwards.

An adult female was found under a stone on the Lebanon, and another in a similar situation at Hasbeiya.

The colours and markings of this Spider are very like those of some species of *Enyo*, but its form and general structure are more like those of *Agelena* and *Tegenaria*, while the maxillæ are nearer to those of *Lachesis* and *Enyo*; and in the position of the eyes it differs from either of the genera mentioned.

Genus AGELENA (Walck.).

AGELENA SYRIACA, Koch, Die Arachn. x. p. 110, pl. 354. fig. 827.

An adult male, and females adult and immature, of this handsome Spider were found on the Lebanon and at Beirût.

Genus Textrix (Sundevall).

Textrix inornata, sp. nov.

Female adult, length 4½ lines.

In form, structure, and in the general position of the eyes this species is very similar to *T. lycosina* (Sund.); but the colours and markings are strikingly different. The *cephalothorax* is dark brown, the caput tinged with yellowish red-brown; the normal indentations are marked by darker lines; and there is a narrow, central, longitudinal white band, which begins near the eyes and ends near the hinder margin, both extremities fining off to a fine line. This band is apparently formed by short, pale hairs.

The *eyes* are seated on a black patch; the two centrals of the front row are the smallest, and those of the hinder row the largest; these last are very prominent and conspicuous.

The *abdomen* is of a uniform dull brownish black and (when in spirit of wine) minutely and pretty thickly mottled with pale dusky; a series of fine angular lines, or chevrons, is visible, chiefly on the hinder part of the upperside. The *legs*, *palpi*, and *sternum* are of a clear brown-yellow, more or less distinctly bounded with dusky brown. The legs are furnished with hairs, bristles, and spines, some of the latter being rather long. Each tarsus ends with three claws.

The *falces* are of a deep red-brown colour; the *maxillæ* and *labium* rather paler, and narrowly tipped with whitish yellow; the spinners are six in number, those of the superior pair long and two-jointed; the second joint directed upwards over the base of the abdomen.

Seven examples of the female (mostly adult) were found in the crevices and interstices of rubbly bank-sides at Jericho, Jerusalem, and Hebron. I was unable to discover the male, which would probably give some other good differential specific characters.

Textrix puta, sp. nov.

Female adult, length 5½ lines.

This species may be distinguished from *T. inornata* by its larger size and its paler (and even plainer) colouring. The *legs* also were destitute of any dark annulation; this last character, however, may be here, as it is in some other Spiders, dependent upon age and other causes.

The *eyes* are of a much more uniform size than those of *T. inornata*, and are not seated on a black patch; the hind centrals are not nearly so large in proportion to the rest, nor so prominent and conspicuous. The *abdomen* is of a uniform pale, dusky, whitish-brown colour; and the genital aperture is smaller than that of the foregoing species, and of a different form.

Adult females were found at Jerusalem.

Genus Tegenaria (Latr.).

Tegenaria intricata, Koch, Die Arachn. viii. p. 29, pl. 261. figs. 610, 611.

An adult male, with females adult and immature, were found at

Jerusalem, and on the plains of Esdraelon, in dark and ruined buildings.

TEGENARIA ANNULIPES, sp. nov.

Female adult, length 4½ lines.

Although very nearly allied to *T. domestica* (Clerck) [non *T. domestica*, Bl.], this species seems to be certainly distinct; it is much smaller, but resembles it so nearly in the general colouring and markings on the upperside, as to need no special description in these respects. The whole Spider, however, has a brighter, clearer yellow look, and a more spotted appearance; the legs are more distinctly spotted and banded with black-brown; and the *sternum*, instead of being dark brown with a central longitudinal dash and a marginal row of yellow spots as in *T. domestica*, must be described as with those colours reversed—that is, as yellow with narrow black-brown intersections, preserving at the same time the character of the pattern in that Spider, the spots in that species being so much expanded as to become in the present one the ground-colour. This reversal of ground-colour and markings is also observable in the pattern on the upperside of the abdomen when the two species are compared.

An adult female, with immature examples of both sexes, were found in crevices of rocks on the sides of the Lebanon range.

Family HERSILIIDES.

Genus HERSILIADA (Sim.)=*Hersiliola* (Thor.).

HERSILIADA SIMONII, sp. nov. (Plate XIV. fig. 9.)

Male adult, length 2 lines; female adult 2¼.

In size, general structure, and appearance this species is similar to *H. oraniensis* (Luc.), but it differs very distinctly in colour and markings. The whole Spider is of a sandy-yellow colour, and the legs and palpi are broadly banded with yellow-brown.

The *cephalothorax* has a deep impression, or indentation, at the junction of the caput and thoracic segments; it has also an irregular band running round above the margins, a central longitudinal one which subdivides into two just behind the eyes, and one from each of the fore pairs of eyes running to the margin of the clypeus; all these bands, or stripes, are of a yellowish-brown colour.

The *abdomen* has a very peculiar and distinct yellow-brown pattern on its upperside; towards the fore part is a largish, somewhat diamond-shaped patch produced forwards; and immediately succeeding and connected with this is an irregularly angular bar, or strong chevron, its angle directed forwards; between this and the extremity of the abdomen, on either side of the ends of the angular bar, is an irregular spot or two of a paler yellow-brown; this pattern is in most examples distinctly but narrowly bordered with a paler yellow edging; this edging is formed by whitish papilliform hairs, with which the whole ground-colour in some specimens is more or less covered; the sides are marked with a longitudinal and roughly dentated, and often indistinct yellowish bar, from which some slightly

oblique lines of indistinct yellow-brown and pale yellow spots drop downwards to the underside. The superior pair of spinners are two-jointed, double the length of those of the inferior pair, and less than half the length of the abdomen; they are yellow, with a brown patch near the base, on the upperside of the terminal joint, which tapers to a point and is furnished with spinning-tubes throughout the length of its inner surface. The relative length of the *legs* is 4, 2, 1, 3, those of the third pair being more than half the length of those of the fourth. The terminal tarsal claws are three in number, and spring from a kind of supernumerary or heel joint.

The *palpi* are moderately long and strong; the radial and cubital joints are of equal length; but the former is rather the strongest, and has no projections or apophyses; the digital joint is large, and has its extremity produced into a longish, tapering point, very like that of some species of *Tegenaria*, and is furnished with two single, slightly curved claws: the palpal organs are well developed, but not complex; they consist of a large, flattish, corneous lobe, round the margins of which runs a slender, filiform, black spine (apparently in a double coil); and from near the centre a somewhat crescent-shaped corneous process projects perpendicularly; one limb of this process is longer than the other, but much more slender, and tapers into a sharp, bent point.

Males and females, adult and immature, were found not unfrequently under stones on the plains of the Jordan, as well as, more rarely, near Jerusalem.

The only structural distinction between this species and *Hersilia caudata* (Sav.) and *H. indica* (Luc.) appears to be that in which it resembles *H. oraniensis* (Luc.)—that is, the absence of an extra joint in the legs (or, more properly, a subdivision of the tarsus). On this ground, and the greater proportional length of the legs of the third pair, both M. Simon and Dr. Thorell have almost simultaneously separated *H. oraniensis*, and formed for it a new genus, *Hersiliada* (Simon), *Hersiliola* (Thorell). As far as I can make out, the name conferred by M. Simon has the priority; but of this I am by no means certain. With regard to the generic value of the subdivision of the tarsus, I confess I am doubtful—that is where other strong and recognized generic characters are common both to those possessing and those not possessing such a peculiarity; it would seem, in this instance, only to mark a group within the genus. As, however, the character is tangible and evident, I have, in deference to the opinion of those able authors, adopted their views here with respect to its generic value in the present instance. It is with the name of one of them, M. Eugène Simon, that I have great pleasure in connecting this distinct and pretty species of a curious genus.

Fam. Scytodides.

Genus Scytodes (Latr.).

Scytodes thoracica, Walck. Ins. Apt. i. p. 271.

An adult female of this Spider was found at Tiberias.

Genus Loxoscelis (Heineken et Lowe).

Loxoscelis rufescens, Duf. An. Sc. Phys. t. v. p. 293, pl. 76. fig. 5.

An adult female of this species was found among the ruins of ancient Jericho.

Fam. Pholcides.

Genus Pholcus (Walck.).

Pholcus rivulatus, Savigny, Arachn. d'Egypte, p. 140, pl. 5. fig. 12.

Males and females, adult and immature, were found among ruins and in old buildings at Jericho, Jerusalem, and Beirût.

Fam. Theridiides.

Genus Ariamne (Thor.)=*Ariadne* (Dol.)=*Prognatha* (Camb. MS.).

Ariamne longicaudata, sp. nov. (Plate XIV. fig. 11 a.)

Male adult, length $2\frac{1}{2}$ lines.

The *cephalothorax* is oval and of a rather flattened form; the general profile-line is level; but there is a deepish transverse dip or depression between the caput and thorax, which gives an appearance of eminence to the former; it is of a dull yellow colour, and has the margins, as well as the hinder part of the caput, broadly marked with blackish brown; besides which, there are two patches, or bars, on the clypeus, one opposite to each fore central eye, of the same colour; the clypeus is sharply impressed immediately below the eyes, but projects greatly thence to the falces, and considerably exceeds in height half the facial space.

The *eyes* are grouped on the highest portion of the caput; four (the largest) form a large square near its summit; and close to each of the two hinder eyes of the square is a lateral pair, the eyes of which are contiguous to each other, the hinder one being close to the hinder eye of the square on its side; the foremost eye of each lateral pair is minute, the smallest of the eight; the two foremost of the square are of a brownish-yellow hue, but appear nearly black, owing to the black spots on which they are placed; the rest are pearly white.

The *legs* are very long and exceedingly slender; their relative length 4, 1, 2, 3, and furnished with fine hairs; they are of a pale yellow colour, suffused with a deeper hue at the joints; the terminal tarsal claws are very minute, and (as far as I could ascertain) three in number.

The *palpi* are similar in colour to the legs, long, slender, and furnished with longish pale hairs; the radial is longer than the cubital joint, both are slightly clavate; the digital joint is small, and the palpal organs simple and inconspicuous; they have a small prominent, curved, corneous sharp-pointed spine near their extremity,

and are turned outwards. The *falces* are short and not very strong; they project in the same plane as the clypeus; and their colour is yellow, with a dusky blackish-brown longitudinal line, or bar, on the upperside of each, in continuation of the bars on the clypeus. The *maxillæ* are rather long and strong; they project beyond the extremities of the falces, are rather hollow on their outer margins, and almost meet over the *labium*, which is about equal in breadth and height, and has its apex somewhat round-pointed. These parts are similar in colour to the legs and palpi. The *sternum* is large, and of an elongate heart-shape; its colour is yellow, suffused with dusky, except a longitudinal central bar-like patch.

The *abdomen* is exceedingly produced behind, where it is long, slender, slightly sinuous in form, and tapers to a blunt point, which is armed with a pale curved (and apparently corneous) process, curving backwards and downwards; near this, on the underside, are four small nipple-like prominences, in form of a quadrangle. The spinners are not remarkable in any way, but the portion of the abdomen behind them is three times the length of that in front; the abdomen is of a dusky colour, almost completely covered by large spots or blotches of a silvery yellowish white, looking like patches of body-colour laid on, and the intersections of these spots form a kind of veining or network; a broad, tapering, brown band, with a prominent point on each side, occupies the central longitudinal line of the fore part; the fine point of this band is black, and is directed backwards; two or three other short black and brown lines follow this. On the underside, between the spinners and the extremity of the abdomen, is a broad somewhat golden yellow-brown band, which tapers to a point at rather more than halfway to the terminal curved process. On the sides of this produced portion of the abdomen are also two or three small black dots.

An adult male of this exceedingly interesting and remarkable-looking Spider was found in webs of *Epëira opuntiæ* (Duf.), on prickly pears, at Beirût; but whether inhabiting these webs in a quasiparasitic state (like Spiders of the next genus, *Argyrodes*), I was unable to ascertain; it certainly has a close affinity to them, as also to *Theridion*; but its peculiar form of abdomen, as well as the form of the cephalothorax and the position of the eyes, sufficiently confirm the goodness of the genus *Ariadne*, founded by Doleschall on a still more remarkably haracteristic form found in Amboina, *Ariadne flagellum*, in which the hinder part of the abdomen is drawn out, in a form resembling the lash of a whip, to more than fifteen times the length of the cephalothorax. The name given to the genus by Doleschall, *Ariadne*, having previously been conferred by Savigny on a genus of *Dysderides*, has been changed to *Ariamne* by Dr. Thorell (Europ. Spid. pp. 37, 63). The *Theridion fictilium* (Hentz, Boston Journ. Nat. Hist. vol. vi. p. 282), found in Alabama, U. S., is evidently of this genus, and nearly allied to *A. longicaudata*. I have received, both from Bombay and Ceylon (from Major Hobson and Mr. Thwaites), examples of the female of a species exceedingly closely allied to, if not identical with, the present.

Genus Argyrodes (Sim.).

Argyrodes epeïræ, Sim. An. Soc. Ent. Fr. 4e sér. tom. vi. p. 282, pl. 4. figs. 1–9.

Numerous examples of both sexes, adult and immature, of this curious little Spider were found in webs of *E. opuntiæ* at Tiberias. Subsequently it was found by M. Simon in a similar situation in Spain, and by him described and the genus characterized in 1866 (An. Soc. Ent. Fr. *loc. cit. suprà*). It appeared to have spun its own little irregular snares among the mazes of the *Epeïra*'s webs, in which it sat, looking like a little morsel of dead stuff, and perhaps deluding the other Spiders into a belief that it was so, and thus escaping being devoured; at any rate all seemed to live together in perfect harmony. The little pear-shaped long-stemmed cocoons of the *Argyrodes* were fastened to the lines of the web; from most of these, however (which I placed in a pill-box), there emerged in a few weeks a small hymenopterous parasite, one only from each cocoon.

Argyrodes syriaca, sp. nov. (Plate XIII. fig. 10.)

Male adult, length 1¾ line; female adult, 2½ lines.

This very distinct species, which resembles the typical forms of the genus in the exceedingly convex and (in profile) somewhat triangular-shaped abdomen, may easily be distinguished by the form of the hinder extremity of the abdomen, which is obtusely produced and divided into four short nipple-shaped divergent prominences. It is of a red-brown colour, marked with black, and mottled with silvery-yellow lines, spots, and markings; and in the female the sides are, in some instances, almost entirely black; in both sexes a deep-brown or black longitudinal marking, with an angular prominent point on either side, occupies the central line of the fore side.

The *cephalothorax* has the thoracic portion higher than the caput; it is of a deep black red-brown colour, and that of the male is produced in front into a somewhat pointed conical eminence directed forwards; around the base of this eminence the eyes are placed on tubercles, and from the centre of the clypeus, which is prominent, there arises a small blunt-pointed, slightly tapering eminence, which, as well as that between the eyes, is furnished with bristly hairs; four central eyes form a largish square; and on either side is a lateral pair, the eyes of each of which are slightly oblique and contiguous to each other; the fore central eyes are the largest, dark-coloured, and, if any thing, wider apart than those of the hind central pair; the rest are of a pearl-white colour; each of the fore central eyes is near, but not contiguous, to the fore lateral on its side. The *legs* are long, slender, and furnished sparingly with fine hairs; they are of a dull yellow colour, somewhat diversely and obscurely clouded, and banded with dark yellow-brown of several hues.

The *palpi* are short, and of a deep black-brown tinged with reddish; the radial and cubital joints are of about equal length; the former

is the strongest; the digital joint is of a long oval form; and the palpal organs are turned outwards; they are not very prominent or complex, though well developed, and, in structure and appearance, very like those of various species of *Theridion*. The spinners are of ordinary size and form. They are (in the male) about equidistant between the cephalothorax and the hinder extremity of the abdomen; in the female they are considerably nearer to the cephalothorax. The eminences, so strongly developed on the caput of the male, are only rudimentary in the female.

Adults of both sexes were found in webs of *Epeïra opuntiæ*, among the branches of prickly pears, at Beirût; the egg-cocoon very nearly resembles that of *Argyrodes epeïræ* (Sim.), being of a pear-shape, produced at the larger end into a sort of obtuse neck, and fastened to the webs by a slender stalk, which radiates into two or three lines at its extremity. Although *A. epeïræ* was abundant in the webs of *E. opuntiæ* at Tiberias, I could not find it here; nor did I there detect the present species, which seemed here to be abundant.

Genus Theridion (Walck.).

Theridion lutipes, Cambr. Journ. Linn. Soc. x. p. 382, pl. xii. figs. 46–51.

An adult male and female of this species were found in the Hotel d'Orient at Beirût; it has since then been described by myself under the above name from examples received from Mr. Nietner from Ceylon.

Theridion spirifer, Cambr. Zool. 1863, p. 8574.

Adults of both sexes were found on low-growing plants at Jerusalem and on the plains of the Jordan; the long slender closely coiled spine connected with the palpal organs of this species makes the male a very easily distinguished Spider; in other respects it is like *T. pulchellum* (Bl.). It appears to have a wide range; I found it in Egypt, as well as at Rome, and have also received it from several parts of France; it was first discovered by myself in the south of England in 1860, and is allied to, if not identical with, *Theridion rufolineatum* (Luc. Explor. en Algér. p. 260, pl. 16. fig. 10); but, as the female only of that species has been described, it is perhaps not the same, but a closely allied one.

Theridion denticulatum, Walck. Ins. Apt. t. ii. p. 305.

Adults of both sexes, between which and our ordinary European forms of the species I could not detect any difference, were found on low-growing plants at Jerusalem.

Theridion varians, Koch, Die Arachn. xii. p. 134, pl. 428. figs. 1056, 1057.

An adult male, which I have but little doubt is of this species, was found on a low plant near Jericho.

THERIDION SIMILE, Koch, Die Arachn. viii. p. 79, pl. 275. fig. 649.

In company with the last, an adult male of this well-marked Spider was also found.

THERIDION VENUSTUM, Walck. Ins. Apt. t. ii. p. 316.

An immature female, which I believe to be of this species, was found at Jerusalem.

THERIDION ALBOCINCTUM, Luc. Explor. en Alg. Arachn. p. 262, pl. 16. fig. 4.

An adult male and females were found at Jerusalem, Jericho, and Hebron, generally under stones.

THERIDION FLAVO-MACULATUM, Lucas (*non* Blackw.), Explor. en Alg. Arachn. p. 257, pl. 17. fig. 4.

An adult and immature females were found near Jericho and at Nazareth.

THERIDION ACUMINATUM, Luc. Explor. en Algér. Arachn. p. 268, pl. 17. fig. 10.

An adult female of this easily determined species was found at Jericho.

THERIDION APICATUM, sp. nov.

Female adult, length $1\frac{3}{4}$ line.

This very pretty *Theridion* is closely allied to *T. uncinatum* (Luc.), but, although resembling it in the peculiar form of the abdomen (which has on the hinder part of the upperside a small but prominent conical tuberculiform eminence directed backwards), it differs in colour and some other specific characters.

The *cephalothorax* is of a dark yellow-brown colour; in its form, and also in the size and position of the eyes, it has nothing remarkable about it; the four central eyes form very nearly a square, those forming its hinder side being rather wider apart than those of the fore side; those of each lateral pair are contiguous to each other; the four eyes of the hinder row are about equidistant from each other; the fore centrals are rather further from each other than each is from the fore lateral on its side; the clypeus is transversely impressed immediately below the eyes, but is prominent at its margin, and its height equals at least two thirds of that of the facial space. The *falces* are also prominent; they project very nearly in the same plane as the clypeus, and are of the same colour as the cephalothorax, as also are the *maxillæ*, *labium*, and *sternum*.

The *legs* are rather long, slender, furnished sparingly with hairs, and of a uniform clear pale yellow colour; the *palpi* are similar in colour, but are tinged with reddish at the joints; their relative length is 1, 4, 2, 3.

The *abdomen* has a whitish-yellow ground-colour, and is reddish

chocolate-brown in the central longitudinal line of the upperside, where there is a pattern formed by two parallel rows of eight well-defined bright cream-white spots; the four foremost of these spots are the smallest, the next two the largest and widest apart; on the sides are several stripes, or bold dashes and spots, of a similar colour; and on the almost vertical hinder part, *i. e.* from the conical prominence to the spinners, is another stripe, which is dentated or slightly branched on the lateral margin: the spinners are encircled by four other similarly coloured spots; and a transverse oblong one is situated immediately in the front of the genital aperture; this last is placed upon a strongish deep-red-brown prominence.

Adult and immature females of this species were found among a prickly heath-like plant growing abundantly on the wastes near Nazareth and Jericho.

THERIDION PARTICEPS, sp. nov.

Male adult, length 1¾ line.

This Spider belongs to a very distinct group of the genus *Theridion* (of which group *T. acuminatum* (Luc.) may be taken as the type), and is nearly allied to, but, I think, distinct from, *Theridion sexalbomaculatum* (Luc.).

The *cephalothorax* is short, broad, convex above, and rises from the hinder margin quickly, but gradually, in a curved convex line to the ocular region, which is thus elevated and prominent; the clypeus is hollow immediately beneath the eyes, but is of great height, and slightly prominent close above the falces; these are small and weak. The colour of the *cephalothorax*, *falces*, and *sternum* is a deep brown, that of the *maxillæ* and *labium* a little lighter. The *eyes* do not differ greatly in size; those of the fore central pair are much further from each other than each is from the fore central on its side; while those of the hinder row appeared to be equidistant from each other; the four central eyes form nearly a square, the transverse being longer than the longitudinal diameter; those of the lateral pairs (which seemed to be the largest of the eight) are contiguous to each other, and flattened on their contiguous sides; the hinder row of eyes is longer than the fore one.

The *legs* are short, rather strong, of a yellow colour, annulated with dark brown, and sparingly furnished with hairs. They do not differ much in length; those of the fourth pair are the longest, and of the third pair the shortest; those of the first and second pairs did not appear to differ appreciably, and were but very little longer than those of the third pair.

The *palpi* are short, and (except the radial and digital joints, which are deep black-brown) similar to the legs in colour; the cubital and radial joints are very short, the latter is of a peculiar bent form, and spreads out at its fore extremity. The digital joints are very large, and have their upper or convex sides turned to each other; they have an angular prominence on their outer sides, towards their extremity, and a slightly abrupt and conically produced, bent, corneous-looking point at their extremity. The palpal organs are

prominent and highly developed, but not very complex; they have a strong, rather twisted, corneous process near their extremity, on the outer side.

The *abdomen* is oval, moderately convex above, slightly pointed behind, and is of a glossy greenish-black colour, thinly spotted, both above and beneath, with silvery spots of various sizes; on the upper-side two of these spots occupy the fore corners (*shoulders*, as it were) of the abdomen; across the middle are four others in a curved row, the two central ones of which are the smallest, the end ones large and sometimes duplex; and three others form a triangle close above the spinners, the apex of the triangle being directed backwards; in one example these last three spots were confluent, or rather connected by streaks of the same colour; the sides have a large oval spot forwards; and on the underside are two more, in a transverse line between the spinners and the middle.

Two examples were found under stones—an adult male at Jerusalem, and an adult female at Hebron.

THERIDION SCRIPTUM, sp. nov.

Male adult, length 1½ line.

This Spider is closely allied to *T. acuminatum* (Luc.), which it resembles in form, but differs in colour and markings.

The *cephalothorax* is of a uniform glossy yellow-brown colour, furnished with a few longish bristly hairs on the caput, which is elevated and prominent, and rises gradually, with a curved profile line, from the thorax; the clypeus is high, transversely impressed below the eyes, and slightly prominent above the falces. The *eyes* are similar in their size and position to those of *T. particeps*. The *legs* are short and moderately strong, their relative length 4, 1, 2, 3; and their colour is yellow-brown, suffused with blackish brown beneath the tibiæ; the tarsi and metatarsi are dark brown; and the femora are also suffused with the same, giving the legs a broadly banded appearance; they are furnished with hairs, some of which are of a bristly nature, and a few on the upperside are erect.

The *palpi* are short; the cubital joint is nodiform; and the radial is very short, but broad and spreading at its fore extremity; the digitals are large, and have their convex sides directed towards each other: the palpal organs are well developed and prominent, but not very complex; at their extremity are two well-defined corneous prominences, one short, obtuse, and perpendicular, the other long and bent both downwards and backwards and with a sharp spiny point near the extremity of the shorter one. The *falces*, *maxillæ*, *labium*, and *sternum* are similar to those of *T. particeps*, and are of the same colour as the cephalothorax.

The *abdomen* is oval, broad before, and rather pointedly produced behind; the fore part is high, and, looked at in profile, falls away gradually in a curved line to the spinners (some females, however, are, when distended with ova, of the ordinary form); it is of a dark glossy black-brown colour, marked above with some bold but dull yellow markings; these are plainer on the female than on the male;

they consist of a broken curved and crescent-shaped band around the fore part, a broad transverse one (divided or interrupted in the middle) nearly across the centre, and, following this, one or two somewhat angular bars, also interrupted in the middle: the spinners are of ordinary form and size, but prominent.

Adults of both sexes were found under stones and among rubbish and herbage on the plains of the Jordan. I found it also in similar situations at Alexandria (Egypt).

THERIDION INSCRIPTUM, sp. nov.

Female adult, length 1½ line.

This species is similar in size and general structure to *T. particeps*, but it differs in the position and size of the eyes, and in the abdomen, which is less pointed behind. The *abdomen* is of a uniform dull black colour; the *cephalothorax* yellow-brown, tinged with blackish, especially in the ocular region, which is diffused with it. The *legs* are yellowish, faintly banded with brown, and the palpi yellow. The *eyes* are large; the fore centrals the largest of the eight, and each of them is almost, if not quite, contiguous to the fore lateral on its side; the hind centrals are, if any thing, slightly nearer to each other than each is to the hind lateral on its side; those of each lateral pair are obliquely seated on a tubercle.

A single example was found beneath a stone on the Lebanon.

THERIDION ERIGONIFORME, sp. nov.

Male adult, length 1⅓ line; female adult, 1½.

This is a very peculiar species; it is, I think, certainly a *Theridion*; but in the form of its cephalothorax, as also in its general form, it is exceedingly like the Spiders of the genus *Erigone* (Savigny).

The *cephalothorax* is of a longish-oval form, and of a deep red-brown colour; the caput is smooth and glossy, the thorax distinctly granulose, especially on the sides and margins; and there is a strong curved indentation at the point of junction between the caput and thorax; the former of these rises abruptly from the latter, and the hinder part of the latter (thorax) is slightly produced backwards, the produced portion fitting into a kind of corneous socket beneath the fore part of the abdomen; the clypeus is slightly prominent and somewhat full. The *eyes* differ but little in size; they are in two transverse curved rows, of which the fore one is the shortest; the two central eyes of each row are respectively nearer together than each is to the lateral on its side; the eyes of each lateral pair are contiguous and seated obliquely on a tubercle; all, except the fore centrals, are of a bright pearly-white hue. The *legs* are moderately long, rather strong, and their relative length is 4, 1, 2, 3; they are of an orange-yellow colour, the femora and the fore part of the tibiæ strongly suffused with dark brown, and are sparingly furnished with hairs; the tarsi have three terminal claws.

The *palpi* are short, the cubital joint is bent, and much less strong than the radial, which last has its fore extremity simple, but closely fitting to the digital joint, so that it appears almost to form

a portion of it; the digitals are small, and their convex sides are turned to each other: the palpal organs are neither prominent nor complex, and are not easy to be distinguished as separate from the digital joint without very careful inspection with a strong lens; they have a small closely adhering and circularly curved filiform black spine at their extremity on the outer side. The *falces* are small, and there is a widish interval between them at their base; they are also prominent near their bases in front, where there are some longitudinal rows of small tubercles or spiny granulations very analogous to the denticulations on the falces of *Erigone longipalpis* (Sund.). The *maxillæ* are strong, greatly curved, and inclined over the labium, so that their extremities are almost in contact with each other. The *labium* is short, of a subtriangular form, the apex being blunt-pointed; the *sternum* has its surface marked with impressed, shallow, round punctures or impressions. All these parts are rather darker-coloured than the cephalothorax.

The *abdomen* is small, of an oval form, and moderately convex above; it is jet-black above, with four small yellowish-white spots including the whole area of the fore part; these spots are of a somewhat transversely linear form, and the two foremost of them are necessarily much nearer together than the two hinder ones; between these and the spinners are three smaller spots of the same colour, and arranged longitudinally in the central line; these last are less conspicuous in the male than in the female, in which latter sex there is also another small but similar spot on either side of the extremity of the line formed by the three spots just before mentioned.

The female has not the prolongation, noticed above in regard to the male, at the hinder extremity of the cephalothorax, nor the peculiar corneous kind of socket beneath the fore part of the abdomen.

An adult male and female were found among herbage on the plains of the Jordan. In those peculiarities of thorax and abdomen in the male just noticed, this species resembles *Theridion mandibulare* (Luc.)=*Epeïra diversa* (Blackw.), a Spider whose position appears doubtful, and perhaps ought to form the type of a distinct genus, but which I have for the present placed in the genus *Pachygnatha* (*vide* post, p. 294).

THERIDION CONSPICUUM, sp. nov. (Plate XIII. fig. 11.)

Male adult, length 2 lines.

This species belongs to the group which includes *T. 4-punctatum*, *T. guttatum*, *T. stictum*, and others, bordering closely upon *Lathrodectus*.

The *cephalothorax* is short, broad, and slightly produced behind, and there is a deep circular indentation at the junction of the caput and thorax; the former is chiefly distinguished from the thorax by its rather raised and prominent fore part where the eyes are seated. The colour of the cephalothorax is a deep rich red-brown; and its surface is marked with fine impressed dots or punctures, and has

(chiefly on the sides and margins) some granulations or small pointed black tubercles, which give its surface a roughened appearance.

The *eyes* are in two transverse rows, of which the fore one is shortest and curved, the hinder one being straight; the hind centrals are rather nearer together than each is to the hind lateral on its side, and the fore centrals are further from each other than each is from the fore lateral on its side; the four central eyes form a square, whose hinder side is shortest, and those of each lateral pair are contiguous and placed obliquely: the clypeus is high, transversely impressed below the eyes, and prominent above the falces.

The *legs* are moderately long and strong, their relative length 1, 4, 2, 3; they are of a yellow colour, and the femora are furnished with numerous small, black, pointed denticulations; the terminal tarsal claws are three in number.

The *palpi* are not very long, but slender, and of a dull greenish-olive hue; the cubital joint is prominent, in a somewhat angular form above, towards its fore extremity; the radial is very small at its junction with the cubital, but broad and spreading at its fore extremity; the digital is of a longish-oval form, with a somewhat pointed lobe near its fore extremity, making it bifid at that part: the palpal organs are well developed and rather complex; they have several prominent corneous and spiny processes, one of a semi-diaphanous nature at their extremity. The *falces* are moderately long and vertical, but rather slender and weak. The *sternum* is thickly marked with small punctures, and is of rather a darker colour than the cephalothorax.

The *abdomen* is short-oval in form, and very convex above, being almost globular in the male, but less so in the female. The male has a kind of corneous socket beneath the fore part, into which the hinder extremity of the cephalothorax fits, as in the last species described; it is a deep rich red chocolate-brown colour, and (in the male) has four large circular shallow impressions on the centre of its upperside, somewhat resembling those on the abdomen of *Gasteracantha*; the upperside is also marked very conspicuously with cream-white spots and bands, forming with the ground-colour a pattern which may be described as a longitudinal series of four to five pairs of markings, occupying the whole upperside; the yellow bars and lines are often more or less obliterated or interrupted, and then form simply three nearly parallel longitudinal broken bars, with traces of some short transverse ones; a more or less continuous bar or line of cream-white runs completely round the sides, and divides the upper from the underside; and in front of the genital opening is a small spot of the same colour.

Adult and immature examples of both sexes of this very pretty and distinct Spider were found in numerous localities throughout Palestine, and always beneath stones. The abdomen of the female is destitute both of the four large circular impressions on the upperside and of the socket beneath the fore margin.

Genus Ero (Koch).

Ero tuberculata, Degeer, Uebers. vii. p. 93. n. 6, tab. 13. figs. 1–9.

An adult male and females were found under stones and among débris of various kinds near Jericho and at Nazareth.

Genus Ctenophora (Blackw.).

Ctenophora monticola, Bl. Ann. & Mag. Nat. Hist. June 1870.

An adult and immature females of this striking species were found in irregular snares among prickly pears at Beirût.

Subsequently to this, the species has been described by Mr. Blackwall from Sicilian examples, and a genus (*Ctenophora*) formed for its reception. Mr. Blackwall has also constituted a separate family for this genus and *Galena* (Koch), with which it is undoubtedly connected. If this family should eventually stand, the genus *Ero* ought, it seems to me, to be added to it; for the Spiders constituting the genus *Ero* are characterized by an exceedingly similar armature of the fore legs to that upon which Mr. Blackwall chiefly bases the establishment of the family; between *Ero* and *Ctenophora* there is also great general similarity of form and structure.

Several striking new species of *Ctenophora* have lately been received from Ceylon, where they were captured by native workmen, among numerous other Spiders, in the Royal Botanic Gardens.

Genus Lathrodectus (Walck.).

Lathrodectus erebus, Savigny, Arachn. d'Egypte, pl. 3. fig. 9.

Adult females of this fine Spider were found beneath stones near Jericho and at Jerusalem.

Lathrodectus pallidus, sp. nov.

Female adult, length $5\frac{1}{2}$ lines; height of abdomen $4\frac{1}{2}$.

This species is nearly equal to *L. erebus* in size, and resembles it in general form and structure; but it may at once be distinguished by its colour and markings, and by the almost perfect smoothness of the abdomen, which in *L. erebus* is thickly clothed with hairs and short curved bristles.

The colour of the *cephalothorax* is yellow-brown, that of the *palpi* and *legs* yellowish; the tarsi, metatarsi, tibiæ, and genua of the latter, as well as the digital joints of the former, being deeply suffused with dark yellow-brown.

The *falces* are dark brown tinged with reddish; the *maxillæ* and *labium* are dark yellow-brown, the extremities of the maxillæ and apex of the labium yellow; the *sternum* also is yellow-brown, equally divided by a tapering longitudinal band, whose point is directed backwards.

The *abdomen* is of a creamy yellow-white colour, with four deep-red-brown spots forming an oblong about the centre of the upper-

side; the two foremost spots are smaller and nearer together than the hinder ones. Besides these, there are twelve other smaller spots of the same colour disposed widely apart, but symmetrically beside and behind the four before noted; the two largest spots are connected by a dull pale line crossed at right angles in the middle by another similar line which branches out irregularly into several finer lines at its hinder extremity; the sides, as well as the fore and hinder parts and a portion of the underside, are slashed (as it were) by a bold denticular or vandyked pattern of a brownish-yellow colour; the points of the denticulations (which are long and curved) are directed upwards and forwards. The underside has a conspicuous clear yellowish-white somewhat quadrate large patch on its centre; this has six black-brown impressed dots longitudinally in three pairs; those of the central pair are almost contiguous to each other; on either side of this patch, principally forwards, are some brown markings and veinings; close in front of the above-mentioned patch is the genital aperture, the process (or epigyne) connected with which is large, prominent, and of a red-brown colour; the aperture itself is of a transverse oval form. The spinners are red-brown and short; those of the superior and inferior pairs are very strong, and on either side of them is a largish dark brown patch, with two or three conspicuous yellow-white spots.

In the position of the *eyes* this species also differs from *L. erebus*; the hinder row (looked at from behind) is straight, and the four eyes of which it is composed appeared to be separated by equal intervals, though, if any thing, the two centrals are the furthest apart, while in *L. erebus* this row of eyes is strongly curved, the curve directed forwards, and its two central eyes are much nearer together than each is to the lateral on its side; the eyes also of each lateral pair are further apart in *L. erebus* than in the present species. The relative length of the legs is 1, 4, 2, 3; the terminal tarsal claws are three, the inferior one strong and very sharply bent backwards.

Adult and immature females were found in irregular snares spun among low plants on the plains of the Jordon; while the only situation in which *L. erebus* was found was beneath stones.

In a similar situation the latter species was also found, not unfrequently, at Alexandria (Egypt) in 1864.

Lathrodectus argus, Sav. Arachn. d'Egypte, p. 137, pl. 3. fig. 10.

Males and females, both adult and immature, of this beautifully marked Spider were found in their snares among low plants near the earth on the plains of the Jordan and near Beirût; the females had usually a sort of domed shelter, covered with bits of leaf and particles of earth, beneath which they sat.

Lathrodectus hamatus, Koch, Die Arachn. vi. p. 105, pl. 206. figs. 507, 508.

An adult male and females were found beneath stones both at Jerusalem and near Jericho.

Genus Erigone (Savigny) +*Neriene* (Bl. ad partem), and *Walckenaëra* (id.).

Erigone rurestris, Koch, Die Arachn. iii. p. 84, pl. 101. fig. 231.

Adults of both sexes of this widely dispersed Spider were found at Jerusalem, the Lebanon, and Beirût.

Erigone incauta, sp. nov.

Male adult, length $\frac{3}{4}$ of a line $=\frac{1}{16}$ of an inch.

This Spider is of the ordinary form, colour, and general structure.

The *cephalothorax* rises gradually from the hinder part to the caput, which is bluff and rounded, but not elevated, and the normal grooves and furrows are not strongly marked; it is glossy and of a deep reddish-brown colour, with black margins. The *eyes* are in two curved rows, of which the foremost is the shortest; those of the hind central pair are rather further from each other than each is from the hind lateral on its side; those of the fore central pair are the smallest of the eight, and are contiguous to each other; the eyes of each lateral pair are seated obliquely on a tubercle. The height of the clypeus is more than two thirds that of the facial space. The *legs* are moderate in length and strength, and do not differ much; their relative length is 4, 1, 2, 3; and they are of a yellow colour tinged with red.

The *palpi* are short and darker-coloured than the legs; the radial and cubital joints are of about equal length, the former is the least strong, and is produced rather on the outer side in front into a longish, prominent, pointed apophysis, which is a little curved downwards, and has a small, prominent sharp tooth beneath; the palpal organs are well developed and prominent, and have a circularly coiled black filiform spine at their extremity.

The *abdomen* is oval and projects over the base of the cephalothorax; it is glossy black and very sparingly clothed with hairs.

Although closely allied to many European species, this one may easily be distinguished by the form of the radial joints of the palpi, taken in conjunction with its colours, the position of the eyes, and the form of the cephalothorax; it is perhaps most nearly allied to *Neriene herbigrada* (Bl.).

Two adult males were found under a stone—one at Jerusalem, the other on the Lebanon.

Erigone inexpedibilis, sp. nov.

Male adult, length $\frac{1}{20}$ of an inch.

This is one of those puzzling species which, though presenting no strongly marked and easily seized differential character is yet undoubtedly distinct from any other; it is allied to *E. rurestris* (Koch), and perhaps more nearly to *Neriene* (*Linyphia*) *oblita* (Cambr.), and *N. pallipes* (id.); but perceptible differences in the relative position of the eyes, the armature of the legs, and the

structure of the palpal organs are visible on a careful comparison with those species.

The *legs* are shorter and stouter than in *E. rurestris*, and the falces also are weaker.

The *cephalothorax* is of a dull yellow-brown colour, suffused with blackish; the normal grooves and indentations are not strongly marked; and the caput scarcely rises above the thoracic level. The *eyes* are in two curved rows of almost equal length; the two hind centrals are slightly further from each other than each is from the hind lateral on its side; the fore centrals are very near together, but not quite contiguous; those of each lateral pair are seated very slightly obliquely on a tubercle; the height of the clypeus is half that of the facial space. The *legs* are rather short and not very strong; and their relative length is 4, 1, 2, 3; they are of a pale dull yellow colour, and are furnished with hairs and a few very slender bristle-like pale spines.

The *palpi* are short; the radial is very short but of the same length as the cubital, and, though very slightly longer in front than beneath, it has no prominence or apophysis at its extremity; the cubital has a single, erect, fine, tapering, black bristle, which issues from near its fore extremity on the upperside; the palpal organs are simple, and consist of a single, large, roundish, corneous lobe, on the surface of which are indistinctly visible some small spiny processes and projections. The *falces* are moderately long, slender, and slightly divergent. The *maxillæ* are short, strong, and very slightly inclined to the *labium*, which, owing to the adherence of some foreign substance, could not be well seen. The *sternum* is convex, heart-shaped, and with the maxillæ of a blackish hue. The *abdomen* is long-oval, very sparingly clothed with hairs, and of a dull pale yellow colour suffused with blackish.

A single example found on a dwarf shrub at Hasbeiya.

ERIGONE DENTATA, Reuss-Wider (Mus. Senck. i. p. 229, pl. 15. fig. 8), var. ORIENTALIS, Cambr.

Adults of both sexes were found among water-weeds on the banks of the stream flowing from Elisha's Well on the plains of the Jordan.

These Spiders, although exactly similar in structural detail, and no doubt the same as *E. dentata*, appear to vary from it almost constantly in colour and markings. Out of numerous examples taken in England, very few, and those chiefly females, presented any trace of even a longitudinal, central, pale band on the abdomen, the usual colouring being a uniform deep black-brown; while out of equally numerous examples found in Palestine (and also in Egypt in 1864), not one was of that normal European colour, most of them being of a pale yellow with a stronger or weaker broken longitudinal brown-black band on either side of the central line of the abdomen; in some examples these brown-black bands are represented merely by three large spots; the underside is also similarly marked; only two or three had the abdomen black-brown with a broad longitudinal cen-

tral yellow band giving off fine, short, lateral lines of the same colour.

To this, seemingly constant, eastern variety I have added the name of *orientalis*.

ERIGONE FEMORALIS, sp. nov.

Female adult, length 1 line.

The *cephalothorax* is of ordinary form, and nearly resembles that of *Neriene livida* (Bl.). The *caput* is not raised above the thorax; and the *clypeus* is vertical, rather exceeding half the facial space in height; the normal indentations are tolerably strong; and it is of a very deep rich brown colour. The *eyes* are small and do not differ much in size; they are in the usual position of two transverse curved rows; those of the hinder row are equidistant from each other, and those of each lateral pair are obliquely seated on a tubercle; those of the fore central pair are the smallest of the eight, very dark-coloured and difficult to be seen, and contiguous to each other; the space between each of these and the hind central nearest to it is very little less than that between the two hind centrals. The *legs* are moderately long and strong; their relative length 4, 1, 2, 3, those of the fourth pair being perceptibly longer than those of the first; they are furnished with hairs and fine bristles, and are of a brightish red-brown colour softening to reddish yellow at the tarsi, the femora being of a very deep red-brown and much darker than any other portion, while the tibiæ have a pale yellow ring round their extremities nearest to the genual joints. The *palpi* are moderate in length, of a dark brown colour, and furnished with hairs and bristles. The *falces* are short, strong, and obliquely truncated on their inner extremities, where they are furnished with fine sharp teeth. The *maxillæ* and *labium* are normal in form; these parts, with the *sternum*, are similar in colour to the cephalothorax; the sternum, however, is of rather a deeper hue. The *abdomen* is long-oval and moderately convex above; it projects over the base of the cephalothorax, and is of a glossy jet-black colour, very sparingly clothed with fine hairs; the genital aperture is large, of a circular or somewhat horseshoe form, and its corneous margins are red-brown.

A single adult female was found on a low-growing plant on the plains of the Jordan.

ERIGONE DENTIPALPIS, Westr. (Aran. Suec. p. 199), var. SYRIACA, Cambr.

Although at present I imagine this to be of the same species as our common European form *E. dentipalpis*, still, as all the distinguishing specific characters of that species are found, as it were, exaggerated or in excess in the present Syrian examples, it may possibly turn out, on further careful examination and comparison, to be distinct; meanwhile I have stamped its variation from our European form by the additional name var. *syriaca*.

These Syrian examples are rather larger than any I have yet found in Europe; the lobes at the fore extremity of the radial joint of the

palpus are bolder and larger, though apparently of the same form; also the tooth beneath this joint is much stronger; there are also some small denticulations visible along the central longitudinal line of the caput when looked at in profile.

Five adult males were found on the roadway between Hasbeiya and Damascus.

ERIGONE SPINOSA, sp. nov. (Plate XIII. fig. 12.)

In size, form, general structure, and armature of the cephalothorax and falces, this yet very distinct species nearly resembles *E. longipalpis* and others; the *legs*, however, are of a redder hue; and the projection or apophysis beneath the fore extremity of the cubital joint of the palpus distinguishes the male at a glance. This apophysis in all the other closely allied species of this group of the genus *Erigone* is either perpendicular to the joint or has a backward direction; in this species, however, it is directed strongly *forwards* beneath the radial joint; it is also slightly sinuous, and less robust than the corresponding apophysis in the other species. The radial joint of the palpus is shorter than the cubital, and has no tooth-like spine beneath it, though in some Egyptian examples there was in the place of such a spine a very minute kind of tubercle and bristle: at the fore extremity on the upperside the radial joint is simply emarginate, and the lobes or prominences thus formed are less conspicuous than in most of the other species alluded to; the prolongation, however, at the fore extremity of the underside of the joint is longer. The digital joint is small, not longer than the radial; and the palpal organs present nothing remarkable in their structure or development. The *cephalothorax* of the male has some small somewhat denticular tubercles in a longitudinal row along the middle of the caput, each being surmounted by a bristle. The female (found only in Egypt) had the falces and margins of the cephalothorax armed with spines, though not so strongly, similar to the male.

E. spinosa appears to be a widely dispersed species. I found it at Cairo and Alexandria (Egypt), also (in Palestine) on the road between Jezreel and Nazareth, as well as at Rome. I have since received it from M. Simon, by whom it was captured near Paris.

ERIGONE PASTORALIS, sp. n. (*Walckenaëra*, Bl.).

Male adult, length $\frac{3}{4}$ of a line, or $\frac{1}{16}$ of an inch.

The *cephalothorax* of this species is of a glossy deep rich red-brown colour margined with black; the *legs* are reddish orange-yellow, and the abdomen brownish black. There is no distinct elevation of the caput, which is gradually confluent with the thorax; the normal indentations are fairly marked; and the height of the clypeus, which is slightly prominent, equals one half that of the facial space. The *eyes* do not differ much in size; those of the hinder row are equidistant from each other; the fore centrals are the smallest and darkest-coloured of the eight and contiguous to each other; the four central eyes form nearly a square whose fore side is the shortest; those of each lateral pair are contiguous to each other, and are seated

obliquely; behind each hind lateral eye is a slight longitudinal depression or indentation. The *legs* are rather long, slender, and provided with hairs; their relative length is 4, 1, 2, 3.

The *palpi* are short; the radial joint is of about the same length, but stronger than the cubital; it spreads rather in a rounded form over the base of the digital joint, and has a largish circular notch or emargination at its upper extremity towards the outer side; the digital joint is small and of an oval form, and the palpal organs are not very complex or prominent; the *falces* are short and powerful, obliquely truncated at their inner extremities, where they are armed with fine teeth. The *abdomen* is of a slender oval form, and projects but very slightly over the base of the cephalothorax.

This species belongs to the group of the genus *Erigone* which includes *Walckenaëra ignobilis*, Cambr., and *W. aggeris*, Cambr., and, although it does not possess any remarkably striking distinctive characteristic, is yet quite distinct from any recorded species.

Two adult males were found among low-growing prickly plants on the waste near Mount Tabor.

ERIGONE PAVIDA, sp. nov. (*Walckenaëra*, Bl.). (Plate XIV. fig. 22.)

Male adult, length $\frac{1}{17}$ of an inch, or rather less than $\frac{3}{4}$ of a line.

This species is very similar to *Walckenaëra nemoralis* (Bl.) in size, colour, and general structure, but may be distinguished without difficulty by the structure of the palpi. As in that species, it has the upperside of the abdomen covered with a punctuose coriaceous epidermis; and the abdomen projects closely over the base of the cephalothorax; the cubital joint of the palpus is longer and stronger than the radial, and of a clavate form; the radial is slight and produced at its extremity *in front* into a tapering pointed apophysis, and on the outer side into a shorter, broader, and obtuse one; the digital joint is of a somewhat irregular form, having a kind of conical curved prominence at its base on the upperside, the extremity of this prominence being in near proximity to that of the pointed apophysis of the radial joint; this character of the digital joint distinguishes it readily from *W. nemoralis* (Bl.): the palpal organs are well developed and rather complex, and have a small black curved spine with a prominent point at their extremity.

A single adult male was found under a stone at Hasbeiya.

Genus LINYPHIA (Latr.).

LINYPHIA ALBULOIDES, sp. nov.

Male immature, length rather less than $1\frac{1}{2}$ line.

This Spider is in colour and markings exceedingly like *L. albula*, Cambr., but may be distinguished at once by a central longitudinal dark brown line on the cephalothorax; this line is bifid before, the bifid portion beginning at the junction of the caput and thorax, each of the two parts thence running to the hind central eye opposite to it. The *legs* are long and slender; their relative length 1, 4,

2, 3, and they are furnished very sparingly with hairs and a few short dark spines; they are of a yellowish colour, with one or two faint dusky brown annulations. The *palpi* had the palpal bulb large and tumid, but undeveloped.

An immature male was found on low-growing plants near Jericho.

LINYPHIA CONGENER, sp. nov.

Female adult, length $1\frac{1}{4}$ line.

This Spider is closely allied to *L. albula*, Cambr., and *L. alticeps*, Bl., as well as to *L. albuloides* (the species last described); it resembles this latter in the bifid line on the *cephalothorax*, which is yellow and has also a blackish marginal line. From *L. albula* it differs in having the sternum of a blackish-brown colour. The *abdomen* is white, with a central longitudinal dark brown bar (which emits fine branches from its sides) on the fore part of the upperside, and continued in a fine line to the spinners; there are also two longitudinal rows of dark nearly confluent spots on the hinder half converging to the spinners: the sides have some ill-defined, oblique, blackish-brown lines; and the underside is black-brown, with three elongate yellow-white spots disposed longitudinally in the central line. The epigyne connected with the genital aperture is simple but prominent, and was apparently fully developed.

The *legs* are long and slender; their relative length 1, 4, 2, 3; they are furnished with hairs and some fine spines, and are of a yellow colour, distinctly annulated with dusky brown.

Adult females of this species were found among shrubs on the Lebanon.

LINYPHIA LEPROSA, Ohl. Die Aran. der Provinz Preuss. p. 47, = *L. confusa*, Cambr. Linn. Trans. xxvii. pp. 427 & 462.

An adult female of this species was found on the Lebanon.

LINYPHIA FRUTETORUM, Koch, Die Arachn. xii. p. 123, pl. 424. figs. 1044, 1045.

Adult females of this very distinct species (though closely allied to *L. pratensis*, Bl.) were found among low-growing plants at Hebron and near Jericho.

Genus PACHYGNATHA (Sundevall).

PACHYGNATHA LISTERI?, Sund. Vet. Akad. Handl. 1829, p. 210.

An immature female of what I believe to be the above species (though from the immature example its specific identity could not be decided with absolute certainty) was found at Damascus.

PACHYGNATHA? MANDIBULARE, Luc. Explor. en Algér. p. 260, p. 17. fig. 1.

Adult males and females of this striking-looking species were found at Jerusalem and near Jericho, generally under stones, but the male occasionally running on the ground. Doubts have been expressed

above, p. 285, upon the genus of this Spider. The form of the palpi and palpal organs of the male differ decidedly from the very peculiar and constant form of those parts in all the species of *Pachygnatha* I have ever seen; in this respect it resembles many species of the genus *Theridion*. The general form of the cephalothorax, the position of the eyes, and the large size and form of the falces appear to connect it with the former; but it must be remembered that none of these characters are, either by themselves or probably together, of generic importance; while in the form of the maxillæ and labium it is decidedly different from *Theridion*, to which it was referred by M. Lucas, and somewhat so from *Pachygnatha*. Mr. Blackwall, who was acquainted only with the female, placed it in the genus *Epeïra*, to some species of which the female bears certainly very great general resemblance; but the maxillæ and labium do not agree with *Epeïra*, and, as far as I have observed, it does not spin a geometric web. Mr. Blackwall also calls attention to a striking difference from *Epeïra* in respect of the lengths of the legs. I am inclined to think that it will eventually be necessary to form a genus for it, between *Theridion* and *Pachygnatha*.

I have received examples of both sexes from Jersey and Serk; and have also myself found it under stones among the ruins of the baths of Caracalla at Rome, as well as at Cairo, Egypt.

Fam. Epeïrides.

Genus Tetragnatha (Latr.).

Tetragnatha molesta, sp. nov.

Male adult.

In form, size, general structure, and colour this species very nearly resembles *T. extensa*, Walck., for which it might be mistaken until the falces were carefully examined; these, in the present species, have each, in addition to two parallel longitudinal rows of teeth along their inner sides, two larger teeth at their upper extremity: one, towards the outer side close to the insertion of the fang, is strong, somewhat flattened from some points of view, and has an enlargement or rudimentary tooth near the middle; the other, towards the inner side, is also equally strong and flattened, but has no enlargement near the middle; the teeth of the two inner parallel rows enlarge as they come near the extremity, except the last tooth on the upperside, which is small and situated close beneath the large one above mentioned as towards the inner extremity; the *fang* of each of the falces has a strongish compression on its inside near the insertion; and the compression is followed by a rudimentary tooth or enlargement.

The *cephalothorax* differs from that of *T. extensa* in having a broad, central, longitudinal, brown band running backwards from the eyes (where its breadth equals that of the hinder row) to the hind margin, where it is almost pointed; this band is composed of several almost confluent brown bars or stripes; the rest of the cephalo-

thorax is slightly suffused with dusky, and has a clear, pale, narrow margin.

An adult male was found on low plants near the stream running through the plains of the Jordan from Elisha's Well, and another in a similar situation near Beirût.

TETRAGNATHA MINITABUNDA, sp. nov.

Male adult.

In size and general form this species also nearly resembles *T. extensa*; its *cephalothorax*, however, is shorter and broader in front, and is of a dark yellow-brown colour with a broad marginal band of a lighter hue, and well defined by a kind of zizzag, irregular, dull orange-yellow line. The *eyes* are very conspicuous from the black spots on which they are seated, and the length of the transverse space they occupy; each fore lateral eye is very minute and seated near, but not quite contiguous to, the hind lateral. The *falces* have the normal double row of teeth on their inner sides; but the upper row is deficient, several teeth being absent from near the fore extremity of the row; at the upperside of the fore extremity of each of the falces is a stronger tooth than any one of those in the above two rows; the tooth is pointed, tapering, directed forwards, and has the slightest possible approach to being bifid at its extremity; close to its base on the inner side is another and much smaller tooth.

The *abdomen* is corrugated along its outer margins. The *palpi* are shorter than in *T. molesta*; and the palpal organs vary a little, though in general form and structure their resemblance to those of that species, as well as to those of *T. extensa*, is very remarkable; the dentition, however, of the falces, joined to the form, colour, and markings of the cephalothorax, and the position of the fore lateral eyes readily distinguish it from both.

This Spider was found among plants in a moist place between Hasbeiya and Damascus.

TETRAGNATHA PERLONGIPES, sp. nov.

Male adult, length 1¾ line; length of a leg of first pair 10½ lines, length of a leg of the third pair 2½ lines, length of a leg of the fourth pair 4 lines.

This species differs from all the European species of *Tetragnatha*, as well as from the two foregoing, in the far less development of the falces and in the shorter maxillæ; the character also of the palpal organs is different. In some respects it approaches near to the group of exotic species, of which *T. decora*, Bl. (gen. *Meta*, Koch?), found in India and Ceylon, is an example; but, on the whole, I imagine that it may become eventually the type of a new genus.

The *cephalothorax* is rounded behind and compressed laterally before; it is yellow in colour, with a broad, central, longitudinal, dark, dusky brown band, as wide in front as the length of the hinder row of eyes, and nearly pointed behind; this band is composed of

broken bars and markings, of which some are somewhat convergent towards the normal indentation at the junction of the caput and thorax.

The *eyes* are large, but not greatly unequal in size; they compose two transverse parallel rows on the fore part of the caput: the front row is the shortest, its eyes are wide apart from each other and seated on conspicuous black spots; those of the foremost row are equidistant from each other; and the hind centrals are further from each other than each is from the hind lateral on its side.

The *legs* of the first and second pairs are very long, nearly six times the length of the Spider itself; their relative length is 1, 2, 4, 3; those of the third pair are very short, less than one-fourth of the length of those of the first pair; they are of a dull orange-yellow colour banded with dusky brown, and furnished with hairs and a few short spines.

The *palpi* are short, of a yellow colour, and furnished with bristly hairs; the radial is much longer and more robust than the cubital joint; it is generally tumid and enlarged at its fore extremity, where on its margin there are two or three long black bristles; the digital joint is not very large, and is more of the ordinary oval form than that of *T. extensa* and others, and its convex side is towards the falces: the palpal organs are well developed and rather complex; they consist of various corneous processes and spines, one of which, on their inner side and immediately beneath the fore edge of the radial joint, is prominent, obtuse, and terminates with several long, strong, black bristles.

The *falces* are of a deep reddish-brown colour, and do not extend beyond the extremities of the maxillæ; they are vertical, moderately strong, and very slightly divergent at their extremities. The *maxillæ* are straight and enlarged at their extremities, and are quite, or rather more than, double the length of the *labium*, but much shorter than those of *Tetragnatha extensa* &c. The *labium* is somewhat of a quadrate form with the apex rather rounded. The *sternum* is of a blackish-brown colour; the fore margin is yellow, and it is divided by a longitudinal tapering stripe of a similar colour.

The *abdomen* is oblong, of a dull yellow colour, mottled with golden or silvery metallic spots on the sides as well as on the upperside, which last has a pattern on it formed by two longitudinal, nearly parallel, zigzag or dentated, broken, blackish lines, while the sides are marked with fine oblique striæ; the underside is dark brown and has two parallel longitudinal bars running throughout its length, of a pale golden-metallic hue; the spiracular plates are large and of a dull pale yellowish hue. The abdomen of the female is rather enlarged and elevated about the middle of the upperside; the epigyne is peculiar, being broad, oval, oblong, and flat, rounded at its extremity, and extends backwards in near proximity to the surface of the abdomen.

An adult male, and females both adult and immature, were found among water-weeds near Elisha's Well on the Jordan plains.

Genus Epeïra (Walck.).

Epeïra herii, Hahn, Die Arachn. i. p. 8, pl. 2. fig. 5.

Adults and immature examples of both sexes of this Spider were found among grass and herbage on the plains of the Jordan.

Epeïra inconveniens, sp. nov.

Female adult, length 3 lines.

This Spider, which is nearly allied to *E. similis*, Bl., may at once be distinguished by the form of the epigyne (or process connected with the genital opening); this, in the present species, is broad and strong, and rather long, tapering towards its extremity, and running backwards in close adhesion to the abdominal surface.

The *cephalothorax* is yellow, strongly margined with black; the *caput* is slightly suffused with dusky blackish brown, especially at its junction with the thorax. The *legs* are yellow, barred on their undersides with black-brown; and their relative length is 1, 2, 4, 3. The *sternum* is yellow, with black-brown margins, the junctional line of the two colours sharply and strongly dentated.

The *abdomen* is of a short oval form, and deep; but its upper surface is rather flat, and it projects over the base of the cephalothorax; its general ground-colour is yellow, mixed and spotted minutely with brown; an oval area comprising nearly the whole of the upper surface is bounded by a strong and obtusely dentate black line or bar; within this area is a broad, longitudinal central band of a clearer yellow than the rest of the surface, and, tapering backwards, is obscurely dentated on its margins; this band is longitudinally bisected by a faint brown line which runs to the spinners, and is crossed at right angles towards its fore part by a similar line; some finer lines of the same nature and colour branch out laterally from the above-mentioned line towards its hinder part; the sides have a reddish and yellow mottled appearance, and are marked by oblique lines of black elongate spots or short dashes; the spinners are surrounded near their base (on the abdomen) by alternate yellow and black-brown blotches; and the underside of the abdomen has its surface, in a large somewhat quadrate form, thickly mottled with brightish yellow; and there is a short transverse black bar close in front of the extremity of the epigyne.

An adult and immature examples of this Spider were found on low-growing plants at Beirût.

Epeïra neta, sp. nov.

Male adult, length 1 line; female adult, length $1\frac{1}{2}$ line.

This very pretty and distinct little species belongs to the group which includes *E. herii* (Hahn), *E. trifasciata* (Koch), and *E. calva* (Bl.). The *cephalothorax* of the male is of a dull reddish-orange colour margined with black; and the caput is distinctly suffused with brownish black. The *legs* are similar to the cephalothorax in colour, and are banded near the joints with black-brown;

the upper half of the femora of the first and second pairs are *wholly*, and those of the third and fourth pairs *partially* of the same colour; they are furnished with hairs, bristles, and long spines.

The *palpi* are of the ordinary epeïriform character; the cubital and radial joints have each a long, strong, curved, spiny bristle issuing from their upperside; the digital joint is prominent on the outer extremity in a somewhat conical or pointed form; the palpal organs are highly developed, prominent, and complex, with corneous spines and processes.

The *abdomen* of the male is small, oval, and black, with four elongate yellow-white spots on the fore part of the upperside in a quadrate form, the two foremost of the spots being oblique; and above the spinners is another spot of the same colour; that of the female is much larger and projects over the base of the cephalothorax; it is also black, but is marked on the upperside with two longitudinal broken bars wide apart from each other, and each composed of 3–4 more or less confluent yellow-white blotches or large spots, the largest being at the fore extremity; in some examples this leaves the intermediate space in the form of a broad, central, longitudinal, dentated, black band; a large yellow-white spot is situated just immediately above the spinners; and on the underside are two longitudinal, parallel, yellow-white bars; these are each composed of two (sometimes confluent) elongate patches or spots. The underside of the abdomen of the male has only a spot of the same colour on either side of the fore part.

An adult male and several females were found on the plains of the Jordan among low herbage, and an adult female in a similar situation at Tiberias.

EPEÏRA INCONGRUA, sp. nov.

This species is very nearly allied to *E. conica* (Bl.) and *E. oculata* (Walck.) both in form, structure, colour, and size; but while differing also in the structure of the palpal organs, it may be at once distinguished from these species by the much greater development of the protuberance at the extremity on the upperside of the abdomen; this protuberance, while much longer and more distinct in all the examples met with, was in one (♀) even enlarged and bent downwards at its extremity.

Both sexes (adult) were found in geometric snares on low-growing plants at Hebron.

EPEÏRA CUCURBITINA, Walck. Ins. Apt. ii. 76.

An immature male of this species was found at Hebron.

EPEÏRA LUCINA, Savign. Arachn. d'Egypte, pl. 3. fig. 4.

Adult females of this Spider were found among low-growing plants on the banks of the stream leading from Elisha's Well near Jericho. It was also found in a similar situation in 1864 near Alexandria, Egypt.

Epeïra antriada, Walck. Ins. Apt. ii. p. 83.

An immature female of this species was found in the Hotel d'Orient at Beirût.

Epeïra apoclisa, Walck. Ins. Apt. ii. p. 61.

Adults of both sexes were met with in geometric snares spun among low-growing shrubs and weeds at Jericho and Tiberias.

Epeïra adianta, Walck. Ins. Apt. ii. p. 52.

An adult male and females were met with in geometric snares at Jerusalem, Nazareth, and on the plains of Esdraelon. I can find no structural distinction between these examples and those met with in England; but the former were all of much larger size.

Epeïra perplicata, sp. nov.

In a Spider so nearly resembling *E. solers* (Walck.), and yet so evidently distinct, it will perhaps be best just to note the most tangible points of difference. It is in general rather less in size, though some examples were fully as large as any I have ever met with of *E. solers*; and the abdomen is more of a subtriangular and less globular form; it is less clothed with grey pubescence, and has a firmer and more coriaceous kind of integument; and the surface of the abdomen is furnished, sometimes pretty thickly, with longish and often semidiaphanous spiny bristles; it has the abdominal pattern better and more continuously defined by the external dentated lines, though more obscure in other respects; the ground-colour of the abdomen in *E. solers* is sprinkled with dark dots and spots, which in the present species are represented by short, dark, irregular lines; and on the underside the two opposite curved yellowish bars constantly present in *E. solers* are commonly replaced by four spots or blotches, as if representing merely the four extremities of the bars in that species. The *eyes* of the lateral pairs, when looked at obliquely from the front, are more nearly in a straight line; a very marked differential character in the adult male is furnished by two thickly set, parallel, longitudinal rows of numerous, very short, strong spines beneath the tibiæ of the legs of the second pair; these have a kind of tuberculous look; also beneath the femora of the same legs are two rows of less conspicuous and more thinly set as well as finer spines; and on the fore side of the femora of the second pair of legs in the adult male there is a straight row of strongish nearly perpendicular spines directed a little outwards, and comprising the whole length of the joints; and the legs generally have a more spiny appearance than those of *E. solers*.

In the *palpi* the horn-like process at the base of the digital joints is, in the present species, more sharply curved at its extremity; and the palpal organs also differ slightly, but distinctly, in structure. In the female the epigyne is longer, not quite so strong, and more sharply bent backwards in the middle; and in both sexes the legs appear to be in general less conspicuously banded. Some female specimens have

no appearance of annulation of the legs at all, while one adult male (found at Nazareth) had the legs very distinctly banded.

Adult females and immature males were found at Jericho, Tiberias, and Beirût, an adult male at Jericho and another at Nazareth. All were found on low-growing plants in geometric snares.

EPEÏRA SOLERS, Walck. Ins. Apt. ii. p. 41.

An adult male and females were found at Jerusalem and on the plains of Esdraelon; they did not differ in any respect from the European forms of the same species.

EPEÏRA CIRCE, Savign. Arachn. Egypte, pl. 2. fig. 9.

An adult male and females were found at Jerusalem.

EPEÏRA OPUNTIÆ, Duf. An. Sc. Phys. tom. iv. pl. 69. fig. 3.

Adults and immature examples of both sexes (except the adult male, which was rare) were found in abundance at Tiberias; the thorn-bushes in the cemetery near the town were a tangled maze of their webs. It was in these webs that the curious quasi-parasitic Spider *Argyrodes epeïræ* (p. 279, *suprà*) was found. At Beirût *E. opuntiæ* was abundant among the prickly pears; and in their webs another species of *Argyrodes* (*A. syriaca*, above described, p. 279) was discovered.

Genus ARGIOPE, Savign. Egypte, Arachn. p. 124, pl. 2. fig. 6.

ARGIOPE SERICEA (Sav.).

Immature examples of both sexes were not rare in geometric webs on low-growing plants on the plains of the Jordan, as well as (but more rarely) in a similar situation at Jerusalem.

ARGIOPE EPEÏROIDES, sp. nov.

Male adult, length 3½ lines; female adult, length 4¼ lines.

The *cephalothorax* is oval, laterally constricted at the caput, and flattish on the upperside; it is of a pale yellow colour, and divided longitudinally by a fine brownish line, which has one or two slight enlargements, and in the male a V-shaped marking at the junction of the caput and thorax.

The *eyes* are in four distinct pairs; those of the fore central pair are the largest of the eight, and wider apart than those of the hind central pair, which are very nearly contiguous to each other; those of each lateral pair are contiguous to each other, obliquely seated; and the fore one of each is separated from the fore central on its side by an interval equal to that which separates the fore centrals from each other.

The *legs* are moderately strong and rather long; their relative length 1, 2, 4, 3; between those of the second and fourth pairs the difference is very slight; they are of a pale yellow colour, furnished with hairs and bristles, and, pretty thickly and regularly, with short

fine black spines, each of which last springs from a minute black tubercle, giving the legs a spotty appearance.

The *palpi* are short, and similar in colour to the legs; their general appearance is that of most of the *Epeïrides*'; the cubital joint is angularly prominent above, in front, where it has two minute black tubercles near together; and from each of these there issues a long, curved, diaphanous spine; the radial joint is very short, and prominent above, and is produced prominently and obtusely on its outer side; it has several longish, curved, pale, spiny bristles issuing from its upperside; the digital joint is oval, and has at its base on the outer side a strong, curved, corneous, red-brown prominence, which projects prominently from beneath the radial joint, so as to make it difficult to see its real origin; the palpal organs project outwards, and are very highly developed, prominent, and complex: they have two strong, corneous, vertical prominences issuing from them; one near their base is the longest and strongest, the other issues from their fore part; near the base of the former, on its inner side, is a short, strong, curved, sharp-pointed spine. The *maxillæ*, *labium*, and *sternum* are of the ordinary character, and of the same colour as the cephalothorax.

The *abdomen* is elongate-oval, pointed at each end; the fore extremity projects over the base of the cephalothorax, and the hinder one over and beyond the spinners; it is of a yellowish-white colour, formed by numerous cretaceous spots; on the upperside are two pale brownish longitudinal bands, one on either side of the central line, tapering and converging to the hinder extremity, about three parts of the way towards which are four small but conspicuous black spots, forming a large and nearly quadrate figure; the two foremost of these spots are the largest and widest apart; the space between the two bands forms a long, narrow, irregularly edged yellowish band, which tapers a little behind; the underside is occupied by a broad, longitudinal, dark, sooty band, which has a narrow white one along its central line; and round the spinners is a sort of circlet of whitish spots. The epigyne is of a dark red-brown colour, somewhat quadrate-oval in form, rather prominent, and looking like a sort of flap, or cover, for the genital aperture. The female has not the four black spots on the abdomen; but in their place is an acutely angular dusky line or bar.

An adult male and two females were found in geometric snares among water-weeds on the banks of the stream leading from Elisha's Well on the Jordan plains.

Fam. Uloborides.

Genus Uloborus (Latr.).

Uloborus walckenaërius, Latr. Gen. Crust. Ins. i. p. 110.

An adult male and females of this Spider were found in geometric snares at Jerusalem and near Jericho; these examples appeared to

be, on careful comparison, undoubtedly identical with *Veleda lineata*, Blackw.

Uloborus plumipes, Luc. Explor. de l'Algér. Arachn. p. 252, pl. 15. fig. 8.

Adult females, easily distinguishable from the foregoing species by the tufts on the legs and other marked specific characters, were found in geometric snares at Hebron and Beirût.

Fam. Thomisides.

Genus Thomisus (Walck.).

Thomisus edax, sp. nov.

This species is of the same size, and so nearly allied to *T. cristatus*, Bl., that no description of general structure, or of colour and markings, would suffice to make it readily recognizable from that species, although there are slight differences in these respects; and there also appears to be one good differential character in regard to the colour in the male adult—which is, that in the legs of the present species the femora, genua, and a portion of the tibiæ are of a uniform deep red-brown colour, and entirely without the longitudinal yellowish stripe on the upperside, which, as far as my experience goes, is always visible on those joints of the legs of *T. cristatus*.

The structure, however, of the palpal organs is very different from that species, and serves to distinguish it at once from both *T. cristatus* and several others almost equally closely allied, viz. *T. audax* (Koch), *T. viaticus* (Koch), and *T. græcus* (Koch, ♂); these organs consist of a large, somewhat whorled or twisted circular lobe, surrounded by a long, strongish, filiform black spine, which adheres closely to the margin of the digital joint; from the hinder part of the circular lobe spring two strong, vertical and nearly contiguous corneous processes; one of these is of a somewhat T-shape, or hammer-headed, as in *T. cristatus*, but the cross part of it is much more nearly at right angles to the stem, or handle part; and one portion of the cross is much longer and straighter-pointed; the other process is stronger, curved, sharp-pointed, and its sharp point nearly in contact with that of the longest limb of the T-shaped process. The female resembles exceedingly closely that of *T. cristatus* and *T. audax*; but it is perhaps rather more like the latter.

Two adult males, and several females adult and immature, were found on the plains of the Jordan, and another (female adult) at Jerusalem.

Thomisus cristatus, Bl. Brit. & Ir. Spid. p. 68, pl. iv. fig. 38.

Adult females, which I have little doubt are those of this species, were found at Nazareth.

Thomisus varius, sp. nov.

Female adult, length 2½ lines.

This Spider, in the general tone of its colour, resembles both *T. sabulosus* (Koch) and the variety of *T. audax* (Koch) found on heaths in England; but it may at once be distinguished from them by its very spotted appearance, the whole of the abdomen, both above and below, being spotted with conspicuous blackish spots and markings, leaving, however, the ordinary pattern of this group quite distinct.

The *cephalothorax* and *legs* are marbled, or mottled, with cream-white and deep yellow-brown; the former has the usual characteristic markings along its centre, but modified by its broken or dentated margins. The whole Spider is tolerably thickly clothed with prominent and strongish, black, spine-like bristles.

Examples of both sexes, but neither of them quite adult, were found at Hebron and on the plains of the Jordan, running on the ground. Though immature, its very striking and spotted appearance proves it to be a good and distinct species.

THOMISUS TRISTRAMI, sp. nov. (Plate XIV. fig. 16.)

Male adult, length 2 lines.

This fine and distinct species has the *cephalothorax* of the ordinary form, but the normal lateral constriction and other indentations are less strong, in fact the latter are almost imperceptible; it is glossy, and minutely punctured with small impressed points; its colour is a deep red-brown, the ordinary central longitudinal marking being entirely obliterated in some examples, but defined obscurely in others by two opposed, and slightly curved, reddish-yellow bars. The *legs* are furnished with hairs, bristles, and spines; those of the first and second pairs long and strong; all the joints, except the tarsi and metatarsi, are of the same colour as the cephalothorax; and the articulations of the joints are defined by narrow yellow-white bands; in some examples the legs are mottled more or less with reddish-yellow; the tarsi and metatarsi of the first two pairs are of a dull yellow; the legs of the third and fourth pairs have those joints also coloured like those of the first two pairs; but the tibiæ and genua are mottled with brown and yellow, and striped with white; the remaining joints are similarly but more pale-coloured than in the other legs.

The *palpi* are short; the radial joint is strong, and has a longish projection, or apophysis, at its outer extremity on the upperside; this apophysis is somewhat bifid at its extreme point; and beneath it, on the outer side, is another much stronger and obtuse; and on the underside of the joint is a third apophysis, long, strong, much curved, and with a small pointed prominence beneath it and towards its base: the palpal organs are well developed, but not very complex; their outer margin is encircled by a strong, black, filiform spine; and towards their fore extremity is a strong corneous process, which is produced into a curved sharp-pointed spine.

The *abdomen* is oval, rounded behind, rather of a flattened form, and projects over the base of the cephalothorax; it is of a yellowish colour, mottled and marked with deep red-brown and white (with the latter most conspicuously on the sides). The ordinary dentated

pattern on the upperside is present; some oblique lines of blackish red-brown spots traverse the sides, which are wrinkled; the underside is of a dull brown colour, and devoid of any characteristic markings; the spiracular plates are red-brown margined with yellow.

The female is larger than the male, and much paler and less conspicuously marked, but resembles it in its general characters; it appears liable to vary more in this (♀) sex than in the other, some varieties of the former closely resembling rather dark examples of *T. audax* (Koch): the females, however, of many *Thomisi* are exceedingly difficult to distinguish from each other; and it may be that more than one species is included among those examples which at present I suppose may be varieties of *T. tristrami*; but in the absence of the males it is impossible to determine this satisfactorily.

This species appeared to be more abundant than any other one of the genus met with in Palestine and Syria; the females were found under stones, the males running on the ground and upon plants and shrubs at Jerusalem, Jericho, Nazareth, Damascus, the Lebanon, and various other localities. I have taken the liberty of naming it after the Rev. H. B. Tristram, whose name, in connexion with the zoology of Palestine and Syria, is too well known to need any comment.

Thomisus græcus?, Koch, Die Arachn. xii. p. 68, pl. 412. fig. 1002.

An adult female, which I believe to be of this species, was found near Jericho.

Thomisus confluens, Koch, Die Arachn. xii. p. 67, pl. 412. fig. 1001.

Adult females of this Spider were found at Jerusalem, and on the plains of the Jordan, near Jericho.

Thomisus rigidus, sp. nov.

Female adult, length nearly 2 lines.

In colour and general appearance this Spider very closely resembles both *T. versutus* (Bl.) and *T. trux* (*id.*), and it is of the same size; the dark lateral band on the cephalothorax, however, of those species is less distinct in the present, the whole of the sides of the cephalothorax being dark-coloured, except a slight mottling with yellow—more resembling, in this respect, *T. simplex* (Cambr.); but from all these it may be distinguished readily, both by the yellow, brown, and white marbled legs, and especially by the abdomen and cephalothorax being furnished with short, stout, erect, clavate bristly hairs: in this character it approaches *T. claveatus* (Walck.); it is, however, a larger Spider than that, and differs greatly in colour and markings; and the clavate hairs appear to be rather less abruptly clubbed at their extremities.

Adult and immature examples were found on the plains of the Jordan.

THOMISUS CLAVIGER, sp. nov.

Female adult, length 1½ line.

This species resembles *T. rigidus* in general colouring and appearance, but it is a darker Spider; the legs are stronger and more spiny, some of the spines on those of the first and second pairs issuing from distinct and strongish tubercles. Like *T. rigidus* it has the abdomen and cephalothorax furnished with clubbed bristly hairs; these are much more abruptly clubbed than in either *T. rigidus* or *T. claveatus*; the cephalothorax is also shorter and more elevated in the thoracic region; and the abdomen projects more over its base. A good specific character is also furnished by the *sternum*, which is of a deep brown colour, marked on its fore part with a more or less strong and somewhat angular crescent or border of yellow.

An adult female was found on the plains of the Jordan, and another at Nazareth, under stones.

THOMISUS RECTILINEUS, sp. nov.

Female immature, length 1½ line.

Although immature, I am inclined to think that this is a very distinct species, from the clearness and peculiarity of the pattern on the abdomen.

The *cephalothorax* is glossy, and, though of the ordinary form, has but little lateral constriction at the caput; the usual indentations are also nearly imperceptible; the colour of the cephalothorax is a uniform deep yellow-brown, with a distinct and clear, but narrow, yellow-white margin. The *legs*, the two first pairs of which are long and strong, are furnished with hairs, bristles, and spines, and (as also are the sternum, maxillæ, and labium) are of a dull yellow colour. *Abdomen* with five transverse white stripes across its hinder half; the foremost of these stripes is broken in the middle and of a very slightly angular form; the rest are straight (or in some examples very slightly curved) and decrease in length with the decreasing breadth of the abdomen. Both the cephalothorax and abdomen are thickly furnished with erect bristles.

Several examples were found on low-growing plants near the mouth of the Dog River (Nahr el Kelb) near Beirût.

THOMISUS DIANA, Savign. Egypte, Arachn. p. 161, pl. 7. fig. 1.

Adults of both sexes of this pretty species were found on low-growing plants on the plains of the Jordan near Jericho; it was also found in various localities and in similar situations in Egypt in 1864.

THOMISUS ROTUNDATUS, Walck. Ins. Apt. i. p. 500.

Adults and immature examples of both sexes were not unfrequent on plants and flowers at Jerusalem, Nazareth, Jericho, and in other localities.

THOMISUS PLORATOR, sp. nov.

Male adult, length 2¼ lines.

This very distinct and fine species is of the ordinary Thomisiform shape, and belongs to the same group as the two foregoing species.

The *cephalothorax*, whose profile is strongly and evenly rounded, is broad in front, with but slight lateral impression at the caput; and the ordinary indentations are almost imperceptible; it is furnished with a few longish, but not very strong, prominent bristles. It is glossy, and of a deep and almost jet-black colour, with a slight brownish tinge.

The *eyes* do not differ much in size; those of the hind central pair (which are, perhaps, the smallest of the eight) are distinctly wider apart than those of the fore central pair. The *legs* are of the deepest rich black-brown, the tarsi, metatarsi, and tibiæ being each annulated with one yellow ring; they are furnished with hairs, bristles, and not very strong spines; those of the first and second pairs are long and moderately strong. The *falces* (which are of a strong conical form and prominent at their base in front), with the *maxillæ*, *labium*, and *sternum*, are of a deep brown, approaching black.

The *palpi* are short and of a deep red-brown colour; the radial joint is of the same length as the cubital, and has its outer extremity produced into a strong apophysis; this apophysis has its extreme point bifid; and beneath the joint is another strong apophysis. The *palpal organs* are not very highly developed or complex; a strong circularly coiled spine surrounds them; this spine is not in contact with the margin of the digital joint as in many other species of *Thomisus*, but is free and separate from it.

The *abdomen* is oval, moderately convex above, and projects over the base of the cephalothorax; it is thinly furnished with bristly hairs, and is of a dull but deep black colour; and on the upperside are two large, conspicuous, pointed, oval yellow-white spots, placed transversely, and each somewhat obliquely, across the middle; some obscure rust-red markings are faintly visible between these spots and the spinners, but no pattern is discernible; possibly some variety exists in different examples in respect of the abdominal markings and depth of colouring.

A single example was found running on the ground at Jerusalem. It resembles more nearly some very dark examples of the male of *T. rotundatus* than any other species known to me; but the structure of the palpi and palpal organs distinguish it at once from that species.

THOMISUS BUFFONII, Savign. Egypte, Arachn. p. 164, pl. 6. fig. 10.

An adult male and females of this remarkable Spider were found on bare spots on the ground at Jerusalem and on the plains of the Jordan.

THOMISUS SETIGER, sp. nov. (Plate XIV. fig. 15.)

Male adult, length 2½ lines.

In its size, general colouring, and the very peculiar armature of the whole Spider, with long pale-coloured spiny bristles and hairs, this species is closely allied to, and nearly resembles, both *Thomisus*

buffonii (Savign.) and *T. hirtus* (Koch); but it may be distinguished at once from the former by its longer legs, more thinly disposed bristly armature, and also by the genua and fore extremities of the tibiæ and metatarsi of the first and second pairs of legs being of a bright brownish red colour. From both these species it may be distinguished by the structure of the palpi: in the present species the radial joint, which is stouter than the cubital, has two long strong apophyses from its extremity; one, on the outer side, widens and is bifid at its extremity; the other, beneath, is simple but broader and rounded at its extreme point: the palpal organs are simple and have a long strong black spine coiled round them; the digital joint is angularly prominent or pointed on the middle of the outer margin.

The *cephalothorax* is yellow narrowly margined with white, and has two longitudinal reddish yellow-brown bands, between which, along its central line, is a white bar or line; these colours are not very strongly defined.

The *abdomen* is whitish mixed with yellow, and with two indistinct longitudinal bands of a brownish-yellow colour along its upperside; in some examples these are broken into spots or patches; the sides are longitudinally rugose, and the prominent portions of the wrinkled surface are shown by white lines. The abdomen of *T. buffonii* in all the examples met with was unicolorous.

Of the present distinct and interesting species three adult males were found on the ground in barren places near the sea at Beirût. The peculiar clothing of long pale spines and bristles affords an evident protection to this and the preceding species, making them look exactly like bits of coarse fleecy wool, or the rough seeds of some plant or other; had I not observed them moving, they would probably have escaped notice.

THOMISUS LATERALIS, Koch, Die Arachn. iv. p. 43, pl. 120. fig. 277.

Adults of both sexes were found among weeds and rubbish on the banks of the stream running through the plains of the Jordan from Elisha's Well. The males are exceedingly active.

THOMISUS ABBREVIATUS, Walck. Ins. Apt. i. p. 516.

An adult male, and females both adult and immature, were found on plants and flowers at Jerusalem.

THOMISUS PERONII, Savign. Egypte, Arachn. p. 163, pl. 6. figs. 7, 8.

An adult female was found near Jericho.

THOMISUS SPINIFER, sp. nov. (Plate XIV. fig. 14.)

Male adult, length $1\frac{1}{4}$ line.

In general appearance, structure, and colour the male of this Spider nearly resembles that of *T. abbreviatus* (Walck.); the legs, however, are not nearly so long, and it may at once be distinguished by the

abdomen (which is generally of a uniform mottled yellowish hue) being of a more oval form, and both that and the cephalothorax (which has the central portion yellow and the sides yellow-brown) being furnished over the greater part of their surface with small but conspicuous tubercles, each of which is surmounted by a short, strong, pale-coloured spine. The *palpi* also differ very decidedly in their structure from those of *T. abbreviatus*; the radial joint instead of being produced at its outer extremity into a long, strong, and somewhat clavate apophysis, has merely two prominent spiny projections from near the middle of the outer side; the palpal organs are simple but prominent, and have a small acute corneous projection near their base on the outer side.

The *female* greatly exceeds the male in size; but the *cephalothorax* resembles that of the latter sex; its colour is yellow, the ocular prominences and face white, and there is a broad longitudinal deep yellow-brown band on either side. The *legs* are yellow, marked irregularly with cretaceous white and red-brown. The *abdomen* is strongly rounded behind, but has, towards the fore extremity of the upper part, on either outer margin, a short subconical prominence, marked in some examples with a conspicuous black dash or spot; the rest of the abdomen is of a pale whitish yellow, with occasionally some brownish markings on and beneath its fore extremity; some examples (chiefly immature) are destitute of all dark markings, whether on the cephalothorax, legs, or abdomen.

Adult males, and females both adult and immature, were found on low-growing plants and flowers on the plains of the Jordan. It was also met with in Egypt in 1864; and in a collection of Spiders received from Major Julian Hobson from Bombay there were numerous females which (speaking diffidently in the absence of any example of the male) I believe to be of this species.

Fam. Philodromides.

Genus Philodromus (Walck).

Philodromus thorellii, sp. nov.

Male adult, length 2 lines.

This Spider is nearly allied to *Araneus formicinus* (Clerck) (*Thomisus rhomboicus*, Hahn), which it resembles in the general character of its markings, but may be easily distinguished by these being less distinct, by its smaller size and longer legs, which differ also (at least in the males) in their relative proportion, and by the absence of any apophysis at the outer extremity of the radial joint of the palpus.

In *the present species* the legs of the *second* pair (♂ ad.), in *T. rhomboicus* those of the *fourth* pair *are the longest*. Also in *Philodromus thorellii* the dark lanceolate marking along the centre of the fore half of the upperside of the abdomen has two distinct prominent points on the margin of each side, while there are scarcely any perceptible points in that *P. rhomboicus*.

Adults of both sexes, as well as immature females, were found generally distributed throughout Palestine and Syria. The name conferred upon it is that of Dr. T. Thorell, Adj. Prof. Zool. Univ. Upsalæ, Sweden, a most able and hard-working araneologist.

PHILODROMUS ALBINI, Savign. Egypte, Arachn. p. 161, pl. 6. fig. 3.

Adult males of this species were found on the plains of the Jordan and also near Damascus.

Walckenäer has confused both this and the next species with *Araneus formicinus* (Clerck), from which they are perfectly distinct; both were found by myself in Egypt in 1864.

PHILODROMUS FABRICII, Savign. Egypte, Arachn. p. 161, pl. 6. fig. 4.

An adult male, with females both adult and immature, were found running on the ground at Jerusalem and near Jericho.

PHILODROMUS SETIGERUS, sp. nov.

Female adult, length $2\frac{1}{4}$ lines.

This Spider is very nearly allied to *P. thorellii*, but may be distinguished by the form of the characteristic central longitudinal lanceolate marking on the upperside of the abdomen: in that species this marking is acutely pointed behind; but in the present it is cut off transversely in a straight line, with a small projecting point at each corner of its extremity; the *abdomen* is also thinly but conspicuously furnished with short, strong, erect, semidiaphanous bristles or fine spines; the *cephalothorax* is yellow, with a broad deep-brown longitudinal band on either side, leaving a central and two marginal yellow bands, of which the central is the broadest, and has a long wedge-shaped marking faintly defined by brownish lines, which reach from the eyes nearly to the hind margin of the cephalothorax. The *legs* are moderately long, their relative length 4, 2, 3, 1; they are furnished with hairs and a few very fine spines, and are yellow in colour, with a faint brown marking and clouding here and there. The *abdomen* is oviform, and, as above remarked, is armed on its upperside with short strong pale bristles or fine spines; it is of a deepish yellow-brown colour above; and the fore half has along its middle a conspicuous oblong deep-brown marking, with a slightly angular point on either side about the middle, which is its broadest part; its hinder extremity is truncate, with a small point at each corner; this marking has its fore half defined by a yellowish marginal line; the hinder part of the upperside has several short oblique lateral yellowish bars, which run into the uniform yellow ground-colour of the sides; the sides have also a broad longitudinal patch or irregular band of black, on which one or two oblique yellowish bars are observable. The underside of the whole Spider is of a dull pale yellow colour. A single example of the adult female was found on the road leading from Nazareth to Mount Carmel.

PHILODROMUS MEDIUS, sp. nov.

Male adult, length 1½ line.

In form, colour, and structure this species is closely allied to *P. aureolus* (Walck.) and *P. cespiticolis* (*id.*); but it is much smaller and generally paler in hue, and the cephalothorax has a conspicuous white patch (or rather double patch) at the hinder part of the caput.

The *abdomen* is truncate before, and less broad there than behind; the pattern on the upperside is similar; but it appears to be covered with punctures, and hence has a somewhat more mottled or spotted appearance than the species named; there are four red-brown depressed spots about the centre of the upperside, almost in a square; and on each side at the widest part behind is a rather conspicuous, though not large, deep-black-brown irregular spot, and some deeper-red-brown and white mottlings at the extremity of the abdomen on either side just above the line of the spinners; these spots and markings give a character very observable in all the examples met with; the underside of the abdomen is of a uniform, dull, but somewhat satiny white colour; and the rest of the Spider is yellowish.

The *palpi* have the radial shorter than the cubital joint; and the former has a very small pointed apophysis at its outer extremity, the point of the apophysis being in contact with a very slight prominent point at the base of the digital joint; the cubital joint has a single prominent black bristle on its upperside, while on the radial are two longer and stronger ones; the digital joint is rather narrow-oval in form, and not large: the palpal organs are neither highly developed nor complex; they are, in fact, very simple in structure, and present no marked tangible character. Some few examples were much darker than others, and thus in appearance were more similar to *P. aureolus*. The *legs* and *falces*, especially the latter, are thinly speckled with small deep-brown spots. The female is larger than the male, but does not differ, except in the greater obscurity of the colours and markings, one or two examples having the abdomen of an entirely unicolorous ashy white hue, faintly powdered or dusted with dark specks.

This pretty species is very active, and was found on the plains of the Jordan, at Nazareth, Cana-el-Jelil, Carmel, and Beirût, running on the ground, as well as on low shrubs and plants.

Genus SPARASSUS (Walck.).

SPARASSUS WALCKENAËRIUS, Savigny, Egypte, Arachn. p. 159, pl. 6. fig. 1.

Immature examples of both sexes of this fine large Spider were found frequently under stones in various localities. It was also frequent in Egypt in 1864, and would occasionally be found on board the Nile boat (Dahabeah), where it was very useful in catching the Cockroaches with which the boat swarmed in some parts; but neither in Palestine nor in Egypt could I obtain an adult example of either sex.

Sparassus linnæi, Savigny, Egypte, Arachn. p. 160, pl. 6. fig. 2.

An immature female of what I believe to be this species was found under a stone near Jericho.

Sparassus ornatus, Walck. Ins. Apt. i. p. 583.

Undoubted examples of this Spider (♀), though all immature, were found at Beirût. From a well-marked adult male lately received from Switzerland, through the kindness of Dr. C. Collingwood, M.D., I feel convinced that this and the next are but varieties of one species.

Sparassus smaragdulus, Walck. Ins. Apt. i. p. 582.

An adult female was found on the road from Mount Carmel to Cana-el-Jelil.

Genus Heteropoda (Latr.) = *Olios* (Walck.).

Heteropoda kochii, sp. nov. (Pl. XIV. fig. 13.)

Male adult, length 6½ lines; female adult, length 9 lines.

The *cephalothorax* (male) is short, very broad, compressed laterally forwards, and well arched above; the fore margin, looked at from above and behind, is somewhat rounded: its colour is yellow; and it is clothed with hairs of a rather paler hue, and among them are some longer and darker: the normal grooves and indentations are of a rather deeper colour: the profile of the caput and thorax, from the clypeus to the hind margin, forms an even arched line.

The *eyes* are in two curved lines on the fore part of the caput, the curves directed forwards: that of the foremost line, which is much the shortest, is very slight; that of the hinder one is considerable; so that the eyes of each lateral pair are widely separated from each other, the space between them being very nearly equal to that between each fore lateral eye and that one of the fore central pair furthest from it; those of this (fore central) pair are the largest of the eight; the rest are much smaller, but about equal to each other in size; those of the fore central pair are a very little nearer together than each is to the lateral on its side; and the interval between each of the fore centrals and the hind central opposite to it is equal to that between the former and the fore lateral on its side; thus the four central eyes form very nearly a square, the width being a very little less than the length; the space between the hind centrals is scarcely more than one half of that between each and the hind lateral on its side; the foremost row of eyes is situated very close to the lower margin of the cephalothorax, so that the height of the clypeus scarcely exceeds half the diameter of an eye of the fore central pair.

The *legs* are long and comparatively slender; their relative length is 2, 1, 4, 3; those of the second pair measure 21½ lines in length, those of the first pair 15½ lines; their colour is yellow, deepening gradually from near the thorax into a dark red-brown on the meta-

tarsi and tarsi; these two joints are densely clothed beneath with hairs, which form a kind of cushion, intended, no doubt, to give an equal facility of movement in running upon either smooth or rough surfaces; the rest of the joints are sparingly furnished with hairs and a few dark spines of various lengths.

The *palpi* are short and similar to the legs in colour, except the digital joint, which is dark brown tinged with reddish, and, besides some longish pale yellowish hairs, has the greater portion of its fore extremity covered with a dense oval-shaped mat of closely packed, short, sooty, mouse-coloured hairs; the radial joint is less strong than the cubital, and has its outer extremity produced into a large prominent bifid apophysis, the front limb of which is the smaller and two-pointed, the hinder one large and quadrate; the digital joint is of a long narrow-oval form, and its length equals that of the radial and cubital together; the palpal organs are of a deep red-brown colour, well developed, but not very prominent or complex.

The *falces* are rather long and very strong, they project a little forwards, and are rather prominent in front; their colour is yellow-brown, deepening towards the fangs, which are strong and of a rich red-brown colour. The *maxillæ* are moderate in length, broad, enlarged and rounded at their extremities, and in the male slightly inclined to the labium; in the female they are parallel to each other.

The *labium* is short, broad, and rounded at the apex, which, with the extremities of the maxillæ, are of a pale whitish-yellow colour, the rest being of a reddish yellow-brown. The sternum is broad, heart-shaped, and its colour is yellow.

The *abdomen* is short-oval, very convex above (in the female it is almost globular), and furnished sparingly with pale hairs, and a few longer dark hairy ones intermixed; its colour is yellow, with a longitudinal central fusiform band of a paler hue on the fore half of the upperside; this is followed towards the spinners by some very indistinct palish angular lines or chevrons; on either side of the extremity of the fusiform band is a dark brownish dot or spot. In the adult female the legs were shorter; and those of the fourth pair differed in the relative lengths of their joints, and were more nearly equal to those of the second pair than in the male; the femora of the fourth pair were visibly longer than those of the second pair, while in the male the difference was considerably the other way; the spinners were short and compactly grouped.

An adult male and female of this fine Spider, which I have named after my kind friend Dr. L. Koch of Nürnberg, were captured under stones beneath the walls of Jerusalem; and in a similar situation near Jericho an immature female was found.

It differs from any other species of the genus known to me, in the wide separation of the eyes of the lateral pairs; the form of the abdomen is also peculiar; it is probably a very active Spider; but those met with stood resolutely upon the defensive, and made a strong resistance against being captured.

Genus Selenops (Dufour).

Selenops omalosoma, Dufour, Ann. Sc. Phys. 1820, p. 7, pl. 69. fig. 4.

An immature female of a *Selenops* which I believe to be of this species was found under a stone at Jericho.

Fam. Sphasides.

Genus Pasithea (Bl.).

Pasithea virescens, sp. nov.

Female immature, length 2½ lines.

This species is closely allied to *P. viridis* (Bl.), as well as to *P. pulchra* (id.). It resembles them in form and structure, but differs from both in its markings.

The *cephalothorax* is of a dull yellowish-green colour, with some dusky lines and markings, showing the normal indentations; the ocular area is strongly tinged with carmine-red, and is clothed with pale hairs and a few bristles; from each eye of the foremost pair an oblique dusky line runs to the falces, but is not continued upon them (at least it was not in the examples met with; but there may be a variation in some individuals in this respect).

The *legs* are moderate in length and strength, their relative length is 1, 2, 4, 3; and they are furnished with hairs and long spines; they are of a bright yellow colour, spotted and irregularly annulated with bright carmine-red. The *maxillæ* and *labium* are similar in colour to the cephalothorax; and the *sternum* is green.

The *abdomen* is of a bright apple-green colour, with a deeper-green central, longitudinal, tapering band on its fore part, emitting fine lateral oblique lines; it is thickly mottled and spotted with white on the upperside; and some of the larger white spots are arranged somewhat symmetrically in irregular transverse curved rows; and, when captured, the whole of the upper surface was sprinkled thinly with minute crimson spots; these, however, have since faded away.

Immature examples of the female of this showy and strikingly handsome Spider were found in irregular snares on low-growing plants at the upper end of the valley of Hinnom, Jerusalem.

Genus Oxyopes (Latr.).

Oxyopes gentilis (Koch).

Adults of both sexes of this species were found near Jericho, at Nazareth, and also near Beirût.

Oxyopes lineatus, Walck. Ins. Apt. i. p. 375.

Adult males, and females both adult and immature, were found at Jerusalem and Jericho.

Oxyopes sobrinus, sp. nov.

Male adult, length 2½ lines.

In its general colours and their distribution, especially on the abdomen, this species resembles *O. gentilis* (Koch) and *O. variegatus* (Hahn); but it may be distinguished by its rather larger size and more robust form, as well as by the colours being darker, and their less variegated appearance.

The *cephalothorax* has the sides of a deep black-brown colour, somewhat veined and mottled with yellow; the longitudinal central band is yellowish, thinly clothed with white hairs, and it continues in the form of a narrow bar between the two hind central eyes; the *falces* are similar to the sides of the cephalothorax in colour; and the *legs*, which are furnished with spines (some exceedingly long), are yellow, thinly marked or irregularly annulated with dark brown, the greater portion of all the femora being brownish black.

The *palpi* have the radial joint very slightly produced both above and below at its extremity; the digital joint is stouter, and not so elongated at its extremity as in the two other species mentioned above; it is also prominent in an obtusely conical form at its base on the outer side—a character which at once distinguishes it from those species, and allies it nearly to *O. italicus* (Walck.), from which, however, it is decidedly distinct in its markings and also in some points of structure; it is, moreover, smaller, and has the digital joints of the palpi also smaller, and the prominence at their base on the outer side far less strongly developed.

A single adult male was found on the plains of the Jordan.

OXYOPES OPTABILIS, sp. nov.

Male adult, length 3½ lines.

This Spider is similar in size, general colouring, and appearance to *O. lineatus* (Walck.), but may be at once distinguished by the structure of the radial joints of the palpi; in place of the long, broad, and flattened apophysis issuing from the base on the outer side of the radial joint in *O. lineatus*, the present one has (issuing from the same part) a strong but very short, though prominent, hollow apophysis, with an angular point at its extremity and one near it on each side; the apophysis also beneath the extremity of this joint is stronger; and in colours and markings the *clypeus* and *falces* differ a little, being entirely of a uniform brown-black colour; the ocular area also appears to be larger.

An adult male of this species was found on the Jordan plains. It is an interesting one, because it so nearly resembles *S. lineatus*, and yet differs so strikingly in the points above noticed.

Fam. LYCOSIDES.

Genus LYCOSA (Latr.).

LYCOSA (TARENTULA) GRISEA, Koch, Die Arach. xiv. p. 161, pl. 497. fig. 1386.

Adult and immature females of this Spider were found generally distributed.

Lycosa (Tarentula) apuliæ, Walck. Ins. Apt. i. p. 281.

Adult and immature females were found at Jericho, on the plain of Esdraelon, and at Beirût.

Lycosa (Tarentula) narbonnensis, Walck. Ins. Apt. i. p. 282.

A male and females immature of this fine *Lycosa* were found at Jerusalem and on the plains of the Jordan.

Lycosa trucidatoria, Walck. Ins. Apt. i. p. 311.

An immature male, and females both adult and immature, were found on the Jordan plains and at Beirût.

Lycosa sagittata, Koch, Die Arachn. xiv. p. 177, pl. 499. fig. 1395.

An adult male and females of this distinctly marked Spider were found at Jerusalem.

Lycosa nigra? Koch, Die Arachn. xv. p. 13, pl. 508. fig. 1423–24.

An adult male and females were found on the road from Hasbeiya to Damascus.

Lycosa proxima? Koch, Die Arachn. xv. p. 53, pl. 517. fig. 1453–54.

An adult male and females of this species were found on the plains of the Jordan.

Lycosa cambrica?, Bl. Brit. and Ir. Spid. p. 32, pl. 2. fig. 14.

An adult female of what I cannot distinguish from *L. cambrica*, (Bl.) was found among water-weeds on the banks of the stream flowing from Elisha's Well on the Jordan plains.

Lycosa piratica, Bl. Brit. and Ir. Spid. p. 34, pl. 2. fig. 16.

An adult male and immature females of this Spider, which I cannot distinguish from the species to which it is here referred, were found among water-weeds on the banks of the stream issuing from Elisha's Well near Jericho.

Lycosa albimana, Koch, Die Arachn. xiv. p. 202, pl. 504. fig. 1411–12.

Adults of both sexes of this easily recognized Spider were met with in similar situations to those of the last two species, both near Jericho, on Mount Carmel, and the Lebanon.

Lycosa dissonans, sp. nov.

Male adult, length $2\frac{1}{4}$ lines; female adult, 3 lines.

This very distinct Spider appears to be intermediate between *L. picta* (Hahn) and *L. cambrica* (Bl.), but is smaller than either. It resembles them in the form of the cephalothorax, which is rather pointed before, and has a somewhat blunt conical protuberance near

the margin close above the falces and below the two fore central eyes; the ocular area is smaller than in other groups of this genus.

The *cephalothorax* is of a uniform deep rich brown colour, almost approaching to black in front, glossy and totally devoid of pubescence; in which (if this be not accidental) it differs from both the other species mentioned. The *eyes* are in the ordinary position; the line formed by those (4) of the front, or lowest, row is longer than that of the row (2) above it; and its two central eyes are slightly further from each other than each is from the lateral on its side.

The *legs* are moderately long and strong; their relative length is 4, 1, 2, 3, but they do not differ greatly in this respect; they are of a bright yellow colour, the femora strongly suffused with reddish brown, and are furnished with hairs and black spines.

The *palpi* are yellow; the radial and cubital joints are of about equal length; the digital is small, of the ordinary form, and rather less in length than both the former together; the palpal organs are simple. The *falces*, *maxillæ*, *labium*, and *sternum* are similar to the cephalothorax in colour, the falces being of the darkest hue.

The *abdomen* is yellow and black, distributed in a very well-defined bold pattern on the upperside, resembling that of *L. picta*, but better defined, more continuous, and devoid of the red-brown which, with other colours, is conspicuous in that species; the underside in the male is marked with black spots and markings; but these do not exist in the female, which in other respects resembles the male. It differs characteristically both from *L. picta* and *L. cambrica* in being destitute of markings or annulations on the legs.

An adult and immature females were found in moist places near the stream on the plains of the Jordan; an adult male in a similar situation at Beirût; and another adult female at Damascus.

LYCOSA EJUSMODI, sp. nov.

Male adult, length 2 lines.

In form, colours, and general markings this Spider is closely allied to *L. exigua* (Bl.), *L. monticola* (Koch), *L. obscura* (Bl.), and others, from all of which, however, it is decidedly distinct, differing, when compared with them, both in the pattern on the abdomen and in the structure of the palpal organs.

The *cephalothorax* is of a deep brown colour, the ocular area nearly black, and from close behind the eyes a narrow yellow band, pointed at each end, runs to the hinder margin; there is also a short black longitudinal line within this band, marking the thoracic junction, and above the margin on either side is another broken lateral band; the clypeus has a yellowish hue. The *eyes* are in the ordinary position; the line formed by the four small foremost eyes (which are of equal size) is shorter than that of the second row (two eyes); that of the third row (two largest eyes) is the longest; and the two centrals of the foremost row are further from each other than each is from the lateral eye on its side. The *legs* are moderately long and strong; their relative length appeared to be 4, 3, 2, 1 (which is unusual); there is but little difference between those of the

first and second pairs; they are of a dull yellow colour, furnished with hairs and spines, and very faintly banded with dusky brown.

The *palpi* are of a dull yellow colour, furnished, but not so densely as *L. exigua* and others, with blackish hairs; the radial joint is rather stronger, though but slightly, if at all, longer than the cubital; the digital joint is small and of an elongate-oval form; the palpal organs are well developed but not very complex, and present no prominent spine. Nothing, however, but a magnified figure can give a distinctive idea of these, or, indeed, scarcely of those of any other species of *Lycosa*. The *falces* are of a yellowish or yellow-brown colour; the *sternum* brownish, with an elongate central yellow patch.

The *abdomen* is of a narrow oviform shape; the narrow normal *Lycosa* (or fusiform) marking on the fore part of its upperside is yellow margined with dark black-brown, and pointed at its hinder extremity; on either side of this extremity is a spot, or small yellowish patch, to which there succeeds a series of transverse, barely angulated bars, each composed of a double spot or short stripe of yellow; this series reaches to the spinners, where the bars become very short and almost confluent; the first four or five (larger ones) have a blackish spot at either extremity; the sides and underside are yellowish, the former spotted with dark brown.

Two examples, presenting no variety, were found on the skirts of Mount Hermon, near Rûkleh.

LYCOSA DESERTA, sp. nov.

Male adult, length 2½ lines.

This Spider cannot be better described, in respect of form, colours, and markings, than as a small, pale, washed-out but spotty-looking variety of *L. picta*, from which, however, it is certainly distinct, and may be readily separated by the structure of the palpal organs; these are rather simple, and are traversed transversely and rather obliquely from the middle of their inner to near their outer margin by a fine sharp-pointed dark red-brown spine; this spine does not exist in the palpal organs of *L. picta*. The characteristic markings on the abdomen are chiefly indicated by small black spots on a pale yellow and whitish ground. The *legs* are regularly and distinctly spotted with black on a yellow ground.

Examples of both sexes in the adult state were found on desert spots near Damascus.

LYCOSA EFFERA, sp. nov.

Male adult, length 4½ lines.

This Spider is similar to *L. grisea* (Koch) in size, colour, and markings; but in all the examples met with the legs were immaculate, whereas in *L. grisea* all the examples had the legs more or less distinctly banded. Of this latter species, however, I did not obtain an adult male.

The *eyes* are in the ordinary position, the lowest row, formed by the four smallest eyes, is longer than the row above, which is composed of the two *largest* eyes; the two centrals of the lowest row

are larger than the laterals, from which they are separated by a wider interval than that which separates them from each other.

The *palpi* have the radial and cubital joints very nearly of equal length; the former has a small red-brown rather obtuse pointed corneous-looking apophysis at its outer extremity near the upperside; the *digital* joint is longer than both the radial and cubital together; the palpal organs are well developed, and rather more complex than those of species of this genus in general, presenting various corneous prominences and spines.

The *legs* are furnished with hairs, bristles, and spines; the tarsi and metatarsi of the first two pairs have a tolerably dense brush of hairs throughout their length.

Examples of both sexes, adult and immature, were found at Jericho, Hebron, the Lebanon, and Beirût.

LYCOSA FIDELIS, sp. nov.

Male adult, length 3 lines.

This handsome and distinctly marked species belongs to the *L. picta* group, though, from the larger ocular area, it approaches to *L. saccata* (Bl.).

The *cephalothorax* is somewhat pointed before, and without any strong lateral constriction at caput; it is of a deep rich black-brown and yellow colour, marked in the somewhat radiated fashion which characterizes the *Lycosæ* of this group; in some examples the cephalothorax is so dark as to present no markings, and in all the specimens the markings are much obscured by a clothing of dull yellow or yellow-grey hairs. The *eyes* (for a *Lycosa*) are small; the centrals of the lower row are rather larger than the laterals, and are considerably further from each other than each is from the lateral on its side; the length of this lower row is less than that of the row above it.

The *legs* are long, strong, and furnished with hairs and spines; their relative length is 4, 1, 2, 3; they are conspicuously banded with yellow and deep black-brown, and are clothed in parts with grey or whitish-yellow pubescence, especially on the femora. The *falces*, *maxillæ*, *labium*, and *sternum* are of a deep black-brown colour. The *palpi* are moderately long and strong; the humeral joint (except the portion close to its extremity) is deep black-brown; the cubital is shorter than the radial joint; both are of a clear yellow colour; the latter, as also the base of the digital joint, is thickly clothed with bright white hairs, contrasting strongly with the black digital joint, which is large and broad, becoming somewhat abruptly narrowed and pointed at its fore extremity; the palpal organs are prominent and highly developed, consisting of various strong, prominent, corneous spines and processes.

The *abdomen* is black, or black-brown, thinly clothed with yellowish-grey hairs; the normal pattern on the upperside is more or less strongly defined by various larger or smaller blotches or patches of a somewhat dull orange-yellow colour regularly disposed, each blotch being distinctly but thinly spotted with small black dots,

which generally follow the linear direction of the several blotches; the underside is deep brown, faintly marked with longitudinal lines of yellowish spots; in immature examples the underside is yellow.

Adult and immature males were found near Jericho and also at Beirût. In 1864 it was found abundantly near Cairo, Egypt; and I have received numerous examples from Major Julian Hobson from Bombay.

Genus Ctenus (Walck.).

Ctenus syriacus, sp. nov.

Female immature, length 2 lines.

The *cephalothorax* is of the ordinary Lycosiform shape, though rather flat and level in the profile-line of its upper surface; it is of a dull orange-yellow colour, with a broadish irregular margin and two broad longitudinal bands of brown, leaving a narrow yellow central band, with a still narrower lateral one of the same colour on either side. Across all these bands the directions of the normal indentations are indicated by darker lines.

The *eyes* are very unequal in size; four large dark-coloured ones form a strongly curved row on the upper fore margin of the caput, the curve being directed forwards; very close in front of, but not quite contiguous to, each lateral eye is a much smaller whitish-coloured one; and in front of each of the two centrals, close to the margin of the clypeus, is another small eye; these last two forming with the centrals of the curved row a quadrilateral figure, whose fore side is much the shortest.

The *legs* are strong and moderately long; they are of a yellow colour, and are furnished with hairs and spines, some of these last forming a well-defined double series on the undersides of the tibiæ and metatarsi of the first and second pairs. The *palpi* are similar to the legs in colour. The *falces*, *maxillæ*, *labium*, and *sternum* are also of the same colour, the falces being marked irregularly in front with dusky brownish markings.

The *abdomen* is of an oblong-oval form, and its colours are yellow and brownish black, forming the following very distinctly defined pattern:—a broad longitudinal, central, strongly dentated yellow band, having the appearance of a series of united triangles, each truncated at its vertex; within the fore part of this band are two indistinctly defined blackish longitudinal lines converging to a point backwards; the sides are marked with alternate narrow dentated oblique blackish and yellow stripes; the underside is yellow, with a few small irregular blackish spots or markings near the margins.

A single example was found on the plains of the Jordan. The occurrence of this Spider in Palestine is interesting, as being one of the few proofs of an approach to tropical forms of *Araneidea*.

Genus Dolomedes (Latr.).

Dolomedes consocius, sp. nov.

Male and female adult, length from 5 to 6 lines.

In size, form, and colours this Spider resembles *D. mirabilis* (Clerck), from which the chief and most tangible distinctive character that I have been able to detect in the preserved specimens is the formation of the radial joints of the palpi (♂). In *D. mirabilis* the radial joint has at its outer extremity a small apophysis gradually tapering to a fine and somewhat crooked point; in the present species this apophysis is replaced by one longer, and broad throughout the greater part of its length, when it rather abruptly goes off into a fine curved point; the form of the genital aperture in the female is also slightly but distinctly and constantly different from that of the female of *D. mirabilis*. In respect of colour and markings, there seems to be a similar and as great variety as in that species.

An adult male and several females were found on low-growing plants on the plains of the Jordan, an adult male at the foot of the Lebanon near Ain-Ata, and adult and immature females on the plain of Esdraelon. Not having detected in Palestine the European form *D. mirabilis*, it has occurred to me that that species may be replaced there by the present nearly allied but distinct form.

Fam. Salticides.

Genus Salticus (Latr.).

Attus (Sim.).

Salticus sanguinolentus, Walck. Ins. Apt. i. p. 473.

An adult male of this fine and strikingly coloured Spider was found at Kefr Menda, near Cana-el-Jelil.

Salticus hæmorrhoicus, Koch, Die Arachn. xiii. p. 54, figs. 1121–1123.

Adults of both sexes of this species were found near Ain-Ata, on the skirts of the Lebanon. Although exceedingly similar to the foregoing, it is yet very distinct on comparison. It appeared to be a common Spider in this, the only locality in which I met with it.

Salticus castaneus, Sim. Monogr. des Esp. Europ. des Attides, Ann. Soc. Ent. Fr. tom. viii. 4e sér. 1868, p. 31.

An adult female found at Beirût.

Salticus cephalotes (Sim.).

Adults and immature examples of both sexes of this brightly coloured and pretty species were found in various localities, principally on the plains of the Jordan and at Jerusalem. I also met with it subsequently at Corfu; and it has been found by M. Simon in Spain. It is an exceedingly active Spider.

Salticus diagonalis, Sim. Monogr. Ann. Soc. Ent. Fr. tom. viii. 4e sér. 1868, p. 46.

An adult female found at Jerusalem.

Salticus lævigatus, Sim. Monogr. Ann. Soc. Ent. Fr. tom. viii. 4e sér. 1868, p. 51.

An adult male and female on the skirts of the Lebanon.

Salticus albobimaculatus, Luc. Explor. de l'Algér. Arachn. p. 170, pl. 8. fig. 10.

An adult and an immature female on the plains of the Jordan near Jericho.

Salticus ostrinus, Sim. Monogr. Ann. Soc. Ent. Fr. tom. viii. 4e sér. 1868, p. 52.

An adult male at Jerusalem.

Salticus quinquepartitus, Walck. Ins. Apt. i. p. 403.

An adult female on the skirts of Mount Hermon, near Rûkleh.

Salticus monardi, Luc. Explor. de l'Algér. Arachn. p. 156, pl. 7. fig. 2.

An immature male on the plains of the Jordan.

Salticus capreolus, L. Koch, Verh. zool.-bot. Wien, 1867, p. 872.

Adults of both sexes at Jerusalem.

Salticus candidus, Sim. Monogr. Att. Eur., Ann. Soc. Ent. Fr. tom. viii. 4e sér. 1869, p. 70.

An immature female at Beirût.

Salticus affinis, Luc. Explor. de l'Algér. Arachn. p. 161, pl. 7. fig. 4.

An adult female found on the plains of the Jordan.

Salticus arenicolor, Sim., = *Attus mustellatus*, Sim. Monogr. Att. Eur., Ann. Soc. Ent. Fr. tom. viii. 4e sér. p. 530; also vide *ib.* p. 723; et vide *Attus æruginosus*, Sim. Suppl. à la Monogr., Ann. Soc. Ent. Fr. 1871, p. 154.

An adult male on the road from Damascus to Beirût.

Salticus latifasciatus, Sim. Monogr. Att. Eur., Ann. Soc. Ent. Fr. tom. viii. 4e sér. p. 536, pl. 5. fig. 19. (Plate XIV. fig. 18.)

Adults of both sexes on stone walls and rocks, at Hasbeiya and Beirût.

This well-marked species was named and described by M. Simon from examples captured by myself (subsequently to the capture of those in Palestine and Syria) in Corfu, where it was not unfrequent on a wall by the roadside leading from the town to the One-gun Battery.

Salticus fasciatus, Hahn, Die Arachn. i. p. 54, pl. 14. fig. 41.

Adults of both sexes were found at Jericho and Jerusalem. All

the examples were much larger than European ones of the same species; but M. Simon is of opinion that they are identical with the European form.

SALTICUS LINEATUS, Koch, Die Arachn. xiv. p. 43, pl. 474. fig. 1303.

An adult male on the plains of the Jordan.

SALTICUS FULVASTER, Sim. Monogr. Att. Eur., Ann. Soc. Ent. Fr. tom. viii. 4e sér. p. 556.

An adult female on the plains of the Jordan; described by M. Simon from European examples since the capture of the above in Palestine.

SALTICUS BRESNIERI, Luc. Explor. de l'Algér. p. 154, pl. 7. fig. 8.

An adult female on the plains of the Jordan.

SALTICUS SEMIATER, Sim. Monogr. Att. Eur., Ann. Soc. Ent. Fr. t. viii. 4e sér. p. 584.

An adult female at Hasbeiya.

SALTICUS CANESCENS, Koch, Die Arachn. xiii. p. 80, pl. 445. fig. 1144.

An adult female on the plains of the Jordan.

SALTICUS GAMBOSUS, Sim. Monogr. Att. Eur., Ann. Soc. Ent. Fr. t. viii. 4e sér. p. 593, pl. 6. fig. 7. (Plate XIV. fig. 21.)

Adults of both sexes in various localities throughout Palestine.

SALTICUS PAYKULLII, Sav. Egypte, Arachn. p. 409, pl. 7. fig. 22.

An immature female on the plains of the Jordan.

SALTICUS VAILLANTII, Luc. Explor. de l'Algér. Arachn. p. 136, pl. 5. fig. 2.

An adult male of this fine Spider on a prickly pear at Beirût.

M. Simon has lately (Ann. Soc. Ent. Fr. 1871, p. 359) included this species as a synonym of *S. paykullii* (Sav.); but I cannot find any remarks upon it in the page referred to in the index (p. 359).

SALTICUS MULTIPUNCTATUS, Sim. Monogr. Att. Eur., Ann. Soc. Ent. Fr. t. viii. 4e sér. p. 606.

An immature female at Nazareth.

SALTICUS REGILLUS, L. Koch, Verh. zool.-bot. Wien, 1867, p. 879.

An adult male and immature females of this handsome Spider were found on the plains of the Jordan. I met with it in Upper Egypt in 1864, and also subsequently in Asia Minor, near Ephesus.

Plexippus (Sav.).

SALTICUS ADANSONII, Sav. Egypte, Arachn. p. 169, pl. 7. fig. 8.

An adult male was found in the Hotel d'Orient at Beirût. In 1864 I found several examples in my bedroom at the hotel at Alexandria, Egypt; and I have also received in abundance, both from Bombay and Ceylon, examples which I cannot distinguish from those found in Palestine and Egypt.

Callietherus (Koch, Sim.).

SALTICUS TENERUS, Koch, Die Arachn. xiii. p. 43, pl. 440. figs. 1112, 1113.

An adult male at Hebron.

SALTICUS TRICINCTUS, Koch, Die Arachn. xiii. p. 50, pl. 440. fig. 1117.

An adult female at Jerusalem.

SALTICUS INFIMUS, Sim. Monogr. Att. Eur., Ann. Soc. Ent. Fr. t. viii. 4e sér. p. 661, pl. 7. fig. 2.

Adults of both sexes in various localities.

Menemerus (Sim.).

SALTICUS VIGORATUS, Koch, Die Arachn. xiv. p. 14, pl. 470. figs. 1282, 1283.

An immature male at Jerusalem. Lately M. Simon has included this species as a synonym of *Menemerus semilimbatus* (Hahn). *Vide* Suppl. Monogr. (Simon), Ann. Soc. Ent. Fr. 1871, p. 337.

Heliophanus (Koch, Sim.).

SALTICUS MELINUS, L. Koch, Verhandl. zool.-bot. Wien, 1867, p. 870.

Adults at Nain.

Salticus (Latr., Sim.).

SALTICUS TODILLUS, Sim. Monogr. Att. Eur., Ann. Soc. Ent. Fr. tom. viii. 4e sér. p. 712. (Pl. XIV. fig. 19.)

Adults of both sexes under stones at Hûnin, Jerusalem, and in several other localities. I found this species also at Alexandria, Egypt, in 1864.

Attus (Sim.).

SALTICUS (RHANIS, Koch) INSIGNIS, sp. nov.

Adult male, length 1½ line, breadth 1 line; cephalothorax and abdomen of equal length.

The group to which this Spider belongs is characterized chiefly by the great breadth of the Spiders which compose it compared with their length, the close fitting of the abdomen to the cephalothorax,

the general flatness of the whole Spider, and by the large size of the caput, which seems to monopolize almost the whole of the cephalothorax, so that the eyes occupy nearly the whole of its flattened upper area, and the hind slope, which is very abrupt, commences immediately behind the ocular area.

This group melts away insensibly into the more typical forms of the genus *Attus* (Sim.); but still in its chief representatives it is a well-marked group, though not generically distinct from other groups which have yet received the rank of genera from different authors.

This Spider is of a deep rich blackish red-brown colour, the thoracic region, clypeus, and sides of the caput being the lightest and clearest in their hue, and portions of the legs the darkest. It has but very few hairs, the integument being strong and somewhat coriaceous; the upper area, however, of the caput is furnished with some short whitish scale-like hairs. The cephalothorax and abdomen are of equal length; the latter fits over the base of the former very closely; and together they almost appear to compose an undivided animal of an oblong form; the shape of the cephalothorax is oblong, wider in the middle (at the hinder row of eyes) than at the extremities; at that point it has a subangular outline, and is there as wide as its whole length; the ocular area is much broader behind than before, its width before being just equal to its longitudinal diameter; the small eye on either side (forming the second row) is close to the lateral of the front row, and consequently is greatly removed from the eyes of the hinder row, and rather within the straight line formed by each of them and the lateral (on the same side) of the front row. The *legs* are moderately long; those of the first pair are much the longest, and have their femora, genua, and tibiæ inordinately strong compared with the rest; the genua and tibiæ are nearly of equal length, the latter being a little the longest; they are of a clear and bright yellowish red-brown; the legs of the second pair appeared to be the shortest; each tarsus terminates with a claw-tuft; the femora of the first pair are furnished with strong, black, spine-like bristles, the most conspicuous of which form a strong longitudinal fringe on the upperside, and another on the outer side; a similar fringe of less strong and conspicuous spiny bristles is also on the foreside of the tibiæ of the same pair, on which there are also numerous stronger ones beneath; while the metatarsi are furnished on their undersides with a double series of short strong spines.

The *palpi* are moderately long, and not very strong; the radial joint is short, and rather shorter than the cubital: the former has its outer extremity produced into a nearly straight, tolerably strong, and not very long nor very sharp, pointed apophysis, the length of which is not quite equal to that of the joint itself; the digital joint is equal in length to the radial and cubital together, it is of oval form, broadest behind; the palpal organs are well developed but simple in structure, and have a very prominent subconical corneous eminence rather towards their hinder extremity; the *falces* are vertical, strong and straight, and flattened in front.

The *abdomen* is of a rather flattened oval form, squared off in

front, and of a sharp pointed oval shape behind; it is glossy, of a deep blackish red-brown colour, with a few short pale squamose hairs on its upper surface.

A single adult male of this most interesting and distinct Spider was found under a stone at Hebron.

SALTICUS PUTUS, sp. nov.

Male adult, length $1\frac{1}{2}$ line.

In the large upper area of the caput this Spider shows a near approach to the group *Rhanis*; but the relative sizes of the cephalothorax and abdomen are different; the latter is smaller than the former, and of the ordinary oviform type, and does not fit on (as it were) to the cephalothorax; this is deep but flattened at the top; and the caput, although comprising a great portion of the cephalothorax, is yet proportionally not as large as in *Rhanis*; and the small eyes of the second row, instead of being close to the laterals of the front row, and so far more widely removed from those of the hinder row, are nearly equidistant between them.

The *cephalothorax* is black, and not very thickly clothed with yellowish squamose hairs; the upper part of the hinder slope has a short white bar, composed of white hairs. The *abdomen* is black-brown, pretty densely clothed with squamose hairs; there is a white marking, formed of white hairs, at the centre of the fore part of its upperside, and on either side of this white marking is a curved white bar; round the shoulders (as it were) of the abdomen there is also a small tuft of white hairs at its extremity on either side of the spinners; the underside is whitish, clothed with short adpressed hairs.

The *eyes* of the hinder row are wider apart than the length of the front row; and those of the second row are in a straight line (on either side) with the laterals of the front and hinder rows.

The *legs* are moderate in length and strength; they are of a yellow-brown colour, darker at the articulations of the joints, the metatarsi and tarsi being paler than the rest; they are furnished with hairs of various lengths; and the tibiæ and metatarsi of the first pair, which are much longer and stronger than the rest, have some strong spines beneath them; the legs of the first pair, besides being longer and stronger than the others, are much darker in colour, being of a deep red-brown; the tarsi all terminate with a claw-tuft.

The *palpi* are neither very long nor strong; they are of a black-brown colour; the radial joint is shorter than the cubital, and has at its outer extremity a long, pointed, straight apophysis; the digital is rather large, and longer than the radial and cubital joints together; the palpal organs are well developed, but simple in form and structure.

A single adult male was found on short herbage among stones at Rasheiya, on the skirts of Mount Hermon.

SALTICUS DELECTUS, sp. nov.

Male adult, length 2 lines.

In form and general structure this species is of the ordinary type.

The *cephalothorox* is of a deep shining black-brown colour, the caput black; it has a transverse stripe or band of white hairs immediately behind the front row of eyes, also a marginal stripe and a central longitudinal one of the same; this last stripe commences in a sharp angular point (in some examples this point is of a diamond-shape, owing to a constriction just behind its fore extremity) between the two eyes of the hinder row, and runs backwards beyond the beginning of the hind slope.

The *legs* are yellow, and are furnished with a few hairs and fine spines, those of the fourth pair are the longest, and those of the second pair the shortest; each tarsus ends with a small black claw-tuft. The *falces* are black-brown, moderately strong, rather long, and a little projecting. The *palpi* are short and black; the humeral joint has a rather prominent and somewhat pointed enlargement near its extremity on the inner side, very nearly approaching in the structure of this joint to Spiders of the restricted genus *Heliophanus* (Koch); the cubital is longer and stronger than the radial joint, and has its outer extremity prolonged into a strongish blunt-pointed apophysis; the radial is short and of a peculiar form, being so short as to have no linear dimensions on the outer side (which is sharp-pointed), and rather obtusely produced on the inner side forwards; the palpal organs are highly developed and very prominent at their hinder part, which projects backwards; they have a small prominent knob or protuberance on the hinder part of their lower surface. The *abdomen* is black; the upperside is divided from the lower by a lateral marginal stripe on either side of bright white hairs; and a similar central stripe divides it longitudinally; the former stripes are interrupted, or, rather, formed by a series of short white oblique lines or markings towards their hinder portions; the underside is dark brown, with two pale dull whitish and slightly curved longitudinal stripes.

The female resembles the male in the general character of the markings; but the central longitudinal white stripe on the abdomen has some lateral angular points, or short incipient lines, on either side of its hinder portion, in some examples resembling a series of short confluent chevrons; the lateral stripes also run round and meet on the fore margin of the abdomen. Different examples of the female vary in depth of colour.

Both sexes of this pretty *Salticus* were found actively hopping about among stones and short herbage on the plains of the Jordan.

SALTICUS DEVORANS, sp. nov.

Male adult, length from 2½ to 3 lines.

This species is nearly allied, both in form, structure, and colours, to *S. paykullii* (Sav.) and *S. vaillantii* (Luc.), but may be easily distinguished by its much smaller size and by differences in the pattern formed by the distribution of its colour and markings. The present species has no dark marginal border or band on the cephalothorax, while both the other species mentioned have it; and in those species also this marginal band branches upwards in a

straight and almost vertical direction to the fore lateral eye on either side, dividing the side of the cephalothorax from the clypeus, while the whole of the sides of the cephalothorax, as well as the clypeus, in the present species is undivided by any such band; in one example only out of many there was a narrow black marginal line, and the clypeus was suffused with brown-black. From *S. vaillantii* it may be also distinguished by the central longitudinal yellow band on the cephalothorax stopping at the hinder row of eyes, while in that species it runs through the ocular area to the clypeus; it is also broader in general, though more sharply constricted transversely at the beginning of the hinder slope than in the two species mentioned. In one example of the present species there was a conspicuous roundish patch of white hairs near the centre of the ocular area, but quite separate and distinct from the central thoracic band.

The *palpi* in all three species are remarkably similar; in all the humeral joint has a conspicuous tuft of prominent hairs on the outer side near its extremity, but this is perhaps most conspicuous in the present species; the radial joint is slightly shorter than the cubital, and its outer extremity is produced into a tapering, sharp-pointed, moderately long apophysis; the digital joint is large, broad near its base, and rather constricted forwards; the palpal organs are prominent near their base, projecting backwards over the radial joint; and a filiform black spine curves round them, adhering closely to the inner edge of the digital joint.

The female is rather larger than the male, but resembles it in general colours and character.

Adult and immature examples of both sexes were found on walls, rocky banks, and among stones on the plains of the Jordan. An adult male was also met with at Rasheiya.

SALTICUS HELIOPHANOÏDES, sp. nov.

Male adult, length rather more than 2 lines.

This Spider is very closely allied to *S. delectus*, Cambr., *suprà*, nearly resembling it in general colours and markings, but distinguishable by the dark colour of the legs, which are mixed black and brown, especially those of the first pair, and by the absence of any longitudinal curved stripes on the underside of the abdomen, the underside being, in both examples found, of a vinous-brown colour, thinly clothed with short hoary hairs.

The *palpi*, while similar in the position and general character of the prominences &c. of the different joints, have all these more strongly marked and developed; and a similar observation applies also to the palpal organs. The resemblance, therefore, in this Spider to those of the *Heliophanus* group is more marked than in *S. delectus*.

An adult male was found on the road from Kedes to Banias, and another on the road from the Lebanon to Beirût: this last example is considered by M. Simon to be distinct from the former; but a careful examination of the palpi failed to show any structural differ-

ence. Besides the above differences from *S. delectus*, it is a slightly larger Spider.

SALTICUS EPULARIS, sp. nov.

Male adult, length $1\frac{3}{4}$ line.

This species is of ordinary form and structure; the *cephalothorax* is massive, and has the hind slope at some distance behind the hinder row of eyes and very abrupt; it is jet-black, with a narrow marginal border of white hairs, which runs also round the margin of the clypeus; a short broad stripe or band of white hairs also runs a little obliquely backwards from each eye of the hinder row, terminating a little below the commencement of the hind slope of the thorax. The minute eyes of the second row are nearer to the eyes of the first than of the hinder (or third) row; and these last form a rather longer transverse line than those of the first row.

The *legs* are moderately long and strong, their relative length being apparently 1, 3, 4, 2; those of the first pair are much the strongest, especially the femoral joints, which are of a deep rich blackish brown colour, the rest of the joints being dark yellow-brown, and the other legs a paler yellow-brown; they are furnished with white and other hairs (those on the first pair form fringes on the femora and tibiæ), also with fine black spines; and each tarsus ends with a small black claw-tuft.

The *palpi* are short and strong; the cubital joint is longer and stronger than the radial, and, together with the fore extremity of the humeral joint, is furnished above with white hairs; the radial joint has its outer extremity prolonged into a broad and obtusely pointed flattish apophysis, closely adhering to the digital joint and so not readily distinguishable; this last (digital) joint is large, but of ordinary form; the palpal organs are highly developed but simple in structure, and present no peculiar corneous complications.

The *abdomen* is of a deep brown colour above, divided longitudinally by a conspicuous central yellowish-white stripe or narrow band (this in one example was very slightly and finely dentated on the sides of its hinder portion); and two other similar lateral bands form a margin to nearly the whole of the abdomen, not, however, quite meeting in front; when looked at directly from above, these lateral stripes, being rather on the sides than on the upperside, are not distinctly seen; the sides and underside are of a yellowish-brown colour, thinly clothed with short white hairs.

This very pretty and distinct Spider was found among stones on a bare and wild spot near Hasbeiya.

SALTICUS SIMONII, sp. nov.

Male adult, length $1\frac{3}{4}$ line.

This Spider is of a shorter, stouter build than *S. epularis*, but is nearly allied to it, as well as to *Attus ostrinus* (Sim.); it may, however, be readily distinguished by its colours and pattern.

The *cephalothorax* is of a brownish-black colour, very narrowly margined with white hairs; and the caput is slightly furnished above

with yellowish-red hairs: the *eyes* of the front row are encircled with bright shining scarlet hairs; and a large, somewhat oblong, transverse spot or patch of pure white squamose hairs occupies the centre of the ocular area; also close behind each eye of the hinder row is another, much smaller white spot of the same nature.

The *legs* are brownish yellow, the femora of the first pair (which, like those of many other species of this group, have the femora, genua, and tibiæ inordinately strong) being blackish brown; their relative length appeared to be 1, 3, 2, 4; and they are furnished with hairs (those on the tibiæ and femora of the first pair forming longitudinal fringes), also with spines, and a claw-tuft at the end of each tarsus. The *falces* are of ordinary form, and of a red-brown colour, ornamented with longitudinal rows of white squamose hairs.

The *palpi* are short and rather strong; the cubital joint is furnished above with white hairs; the radial, which is shorter than the cubital, has its outer extremity produced into a strong and rather long but not very sharp-pointed apophysis, which curves upwards close by the side of the digital joint; this joint is of ordinary form, and contains the palpal organs, which are simple in structure.

The *abdomen* is of a short oval form, of a deep black-brown colour above, clothed with glossy scarlet hairs; a central longitudinal and somewhat tapering band clothed with white hairs begins a little way behind the fore margin, and ends just above the spinners; this band is finely dentated on its margins; the upperside is completely separated from the sides by a band of white squamose hairs, which runs round the fore margin (where it is broadest) as well as round the lateral margins; the portion of this marginal band or stripe nearest the spinners on either side is formed by a separate short stripe, which overlaps the inner portion; the sides are of a somewhat pale vinous-brown colour striated with lines of white squamose hairs; and a broad central longitudinal band of the same kind occupies the underside.

A single example of this very striking and pretty species was found among stones on the skirts of the Lebanon, near Ain-Ata.

I have much pleasure in connecting this Spider with the name of M. Eugène Simon, who has paid such great and careful attention to the family *Salticides*.

SALTICUS PARTICEPS, sp. nov.

Male adult, length $1\frac{3}{4}$ line.

This Spider is closely allied to, but quite distinct from, *S. bresnieri* (Luc.). The *cephalothorax* is oblong, not so deep, nor the hind slope so abrupt as in many others of this genus; it is of a deep brown colour, the caput black; on the cephalothorax are four longitudinal white lines or stripes, one on either side a little above the margins, and continued in front close beneath the eyes, where it is formed by squamose hairs; another white stripe runs from each eye of the fore central pair backwards, close inside the eyes of the hinder row, quite to the hinder margin; these two stripes are narrower

than the laterals; round the eyes of the front row are some coarsish yellow-red cilia or hairs.

The *legs* are moderately long and strong, not differing greatly in length; their relative length is apparently 4, 3, 1, 2, or 4, 1, 3, 2 (it was difficult to say exactly which); they are of a yellow-brown colour deepening to dark brown black; those of the first two pairs are darker than the rest; the legs are furnished with hairs, spines, and a claw-tuft at the extremity of each tarsus.

The *abdomen* is of a deep blackish yellow-brown colour above, with three narrow longitudinal white stripes (a central, and a lateral one on either side); the sides are white; and the underside is almost wholly occupied by a broad longitudinal black band.

The *palpi* are short, moderately strong, and of a black colour; the cubital joint is clothed with white hairs on the upperside; and the radial is produced at its outer extremity into a short, strong, blunt-pointed apophysis, bifid at its extremity; the radial as well as the digital joint (which last is of ordinary form) are furnished with long bristly black hairs; and the extremity of the digital is also furnished with white hairs; the hairs on the radial joint make the apophysis at its outer extremity difficult to be seen readily. The palpal organs are well developed and prominent at their base, but simple in structure.

A single example was met with among stones at Jerusalem.

SALTICUS STAINTONII, sp. nov. (Plate XIV. fig. 20.)

Male adult, length $2\frac{1}{4}$ lines.

This Spider belongs to a group of the genus *Attus* (Sim.) not yet, as far as I am aware, represented by any ascertained European examples. The group is characterized by a longer and more flattened form of cephalothorax and abdomen than is possessed by other groups of *Attides*. The *cephalothorax* is in itself short, and, when looked at from above, rather of a roundish oval form; its upper surface is flat, but the hind slope tolerably abrupt; it is of a deep rich brown on the sides with a black margin: the caput is black and encircled by a band of white hairs running round in front immediately beneath the eyes, and ending on either side near behind the eyes of the hinder row; at the centre of the back of the caput is a white spot similarly formed.

The *legs* vary a good deal in length; those of the second, third, and fourth pairs are short, those of the third pair apparently the shortest; they are yellow, furnished with a few hairs and small spines; those of the first pair are much longer than the rest and of inordinate strength, especially the femoral, genual, and tibial joints; they are of a deep rich brown colour; the tibial and metatarsal joints are furnished with short strong spines, each of which springs from a distinct tubercle; all the tarsi end with a strongish claw-tuft.

The *palpi* are short and not very strong; they are of a yellow-brown colour, the digital joint being the palest; the radial is shorter than the cubital joint, and has its outer extremity produced into a short, tapering, pointed apophysis, whose base adheres very closely

to the base (on the outer side) of the digital joint, its point being slightly curved and more prominent; the digital is of moderate size and ordinary form; and the palpal organs are neither very prominent nor complex. The *falces* are small, divergent, and placed back considerably behind the fore margin of the caput; the fangs have their bases greatly and abruptly enlarged. The minute *eyes* of the second row are equidistant between those of the first and third rows, but are inside the straight line formed by the laterals of those two rows.

The *abdomen* is of a long oval form, rather flattened above, and projecting over the base of the cephalothorax; it is of a dark brown colour tinged with yellow; in some young examples it was jet-black; its fore half is encircled with a marginal band or stripe of white hairs; and there are six small bright white spots (also formed by white hairs) on its upper surface; two of these spots are placed longitudinally on the centre of its fore half; the foremost of these two spots is sometimes obsolete; the other four are on the margins of the hinder half, and form a large trapezoid, whose fore side is much the longest; the underside is paler than the upper, and has an indistinct marginal line of white hairs on either side.

An adult male and two immature males were found among grass on the banks of the stream flowing from Elisha's Well through the plains of the Jordan. It is a very striking and distinct species; and it is with much pleasure that I confer upon it a name too well known in the entomological world to need any remark—that of my kind friend H. T. Stainton, Esq., of Mountsfield, Lewisham.

SALTICUS CONGENER, sp. nov.

Female adult, length $2\frac{1}{2}$ lines.

This Spider is closely allied to *S. staintonii*, of which, but for M. Simon's decided opinion to the contrary, I should have considered it to be the female. It differs from that species in having the cephalothorax dark brown, uniformly clothed with short greyish-white hairs; and the abdomen is of a pale dull yellow-brown, similarly but more thinly clothed, and striated and mottled obscurely with a paler yellowish colour; a series of angular lines or chevrons (of which the first is much stronger and more pointed than the rest) are indistinctly visible on the hinder half of the upperside; and also some pale blotches corresponding to the white spots in *S. staintonii*.

Three examples were found among grass and weeds on the plains of the Jordan.

SALTICUS PATAGIATUS, sp. nov.

Male adult, length $2\frac{1}{3}$ lines.

This species is of ordinary form and general structure.

The *cephalothorax* is massive; it projects considerably forwards over the falces; and the hind slope is exceedingly abrupt; the sides of the caput and the thoracic portion are of a deep shining reddish black-brown colour, and the upper surface of the caput black, margined on the sides and hinder part (behind the third row of eyes)

with a semicircular band of paler brown, clothed with white hairs; the *eyes* of the second row are equidistant from those of the first and third, and as nearly as possible in a straight line with the laterals of those rows.

The *legs* are moderately long and strong, and of nearly equal length and strength; they are of a deep reddish-brown colour, the tarsi pale dull yellow, and are furnished with hairs and fine spines, each tarsus ending with a claw-tuft.

The *palpi* are short and rather slender; the radial and digital joints are darker-coloured than the legs, the cubital and humeral joints being of a pale dull yellowish brown, furnished conspicuously with white hairs, as is also the extremity of the digital joint; the radial is shorter than the cubital, and has its outer extremity prolonged into a long and strong apophysis, gradually tapering to a sharp point; the digital joint is small but of ordinary form; the palpal organs are simple but prominent behind, and project considerably backwards beneath the radial joint.

The *abdomen* is of a short oval form, slopes rather quickly from its fore extremity, where it is high, to the spinners (when looked at in profile), and fits closely on to the hind slope of the cephalothorax; it is of a brownish-black colour, thinly clothed above with yellowish-red hairs; a strong crescent of white hairs margins the foreside; a little way behind this is a transverse yellowish-white curved bar, which spans the whole of the upperside; and this is succeeded by a close series of strongish angular bars or chevrons on the hinder half, on which there is also a curved longitudinal lateral stripe on either side, connected with the chevrons by a short bar or dentation of the lateral stripes; the sides and underside are striated with longitudinal lines of reddish hairs.

Two adult males were found at Tiberias, and an immature male near Nazareth, among dwarf plants on the waste between that and Mount Tabor. The pattern on the abdomen is less distinct in some examples than in others; and the lateral stripes are sometimes simply replaced by an oblique blotch or stripe. It is allied to *S. adansonii* (Sav.), but easily distinguishable by the larger size of the digital joint.

SALTICUS NEPOS, sp. nov.

Male adult, length 2 lines.

The *cephalothorax* is short and massive, but of ordinary form; it is of a yellow-brown colour, clothed with short yellowish hairs; a transverse somewhat crescent-shaped band of whitish hairs encircles the hinder part of the caput; the clypeus is furnished with longish prominent white bristly hairs; on either side of the caput, below the small eye of the second row, is a group of a few long, strongish, curved, black bristly hairs directed forwards, having a horn-like appearance; and in front of each of these horn-like tufts, but detached from it, is a single bristle of the same nature and having the same direction.

The *eyes* of the front row are pearl-white and encircled with

strong and prominent yellowish scale-like hairs; the eyes of the second row are equidistant from, and in a straight line with, the laterals on either side of the first and third rows.

The *legs* are moderately long and strong, and do not differ greatly in length; their relative length is apparently 3, 4, 1, 2; and their colour is yellow clouded in parts with yellow-brown; they are furnished with spines, bristles, and hairs, of which some are fine and white.

The *palpi* are neither very long nor strong; their colour is yellow, that of the digital joint being yellow-brown; the fore part of the humeral joint, as well as the upperside of the cubital, is clothed with white bristly hairs; the radial is shorter than the cubital, and has some long, strong, bristly white hairs above, rather in a tuft, on the inner side, and with a decided inward direction; the outer extremity of this joint is produced into a short strong apophysis, hollowish on the inner side, and very obtuse at its termination, which appeared to be slightly indented; the digital joint has its upperside clothed with blackish and white hairs; it is of moderate size and ordinary form; and the palpal organs are well developed and prominent, but simple in structure, consisting of a large oval corneous lobe, whose inner side is encircled (just beneath the edge of the digital joint) with a strong black spine which issues from their base.

The *abdomen* is of the ordinary form; it is of a dark yellow-brown colour above, clothed with yellow-red hairs; the fore margin has a large transverse oval band or patch of white hairs; and there is another conspicuous patch of the same (formed by two or three confluent angular bars) rather behind the centre of the upperside; the sides are pale yellowish; and the underside has a broad central longitudinal yellowish-brown band throughout its length.

The *female* in general characters resembles the male; but the cephalothorax is more variegated and diversified in appearance, having a longitudinal stripe of white hairs down the centre of the hind slope, and reaching forwards to the middle of the caput; there are also some dark brown markings on the sides and hinder part of the cephalothorax, which appear through the clothing of hairs (probably the cephalothorax of the male had been partially denuded of hairs). In the female the abdomen has the upperside dark brown-black, indented on the sides near the spinners by one or two short yellowish lines or encroachments from the sides; the centre is (longitudinally) of a yellowish colour; and the fore part is divided in the same direction by a black stripe, club-shaped at its termination, with a black spot on either side about the middle; following this black stripe are the pale chevrons observable on the male.

An adult male and female, with an immature male, were found among stones at Jerusalem.

SALTICUS PASCUALIS, sp. nov.

Male adult, length $1\frac{1}{3}$ line.

The *cephalothorax* is of a rather flattened form, and longer than in many other species of this group; the hinder slope is also less

abrupt; the fore part projects over the base of the falces; and it is of a glossy black colour. The eyes of the second row are each rather nearer to the eye on its side of the third row than to the lateral on the same side of the first, but are in the same straight line.

The *legs* are moderate in length and strength; those of the first pair are the longest and strongest, but not inordinately so; their colour is dark brown, the tarsi of the two hinder pairs being pale yellow; and they are furnished with hairs, spines, and a terminal claw-tuft.

The *palpi* are short, the humeral and cubital joints yellow, and they are furnished with white hairs; the radial is brown, shorter than the cubital, and produced at its outer extremity into a rather long, slender, slightly tapering, curved, and rather prominent apophysis, whose point is slightly hooked or crotchet-formed. The digital joint is rather large, of a brown-black colour, and has a strong circular indentation or impression at its extremity; the palpal organs are large and prominent, and extend backwards beneath the radial joint.

The *abdomen* is of ordinary form; its colour is brown-black, with some white squamose hairs towards the fore extremity of the upperside, and some indistinct pale angular lines or chevrons on the hinder half. The superior spinners are white, tipped with black, the inferior ones black.

A single example of this small but distinct species was found among dwarf herbage at the village of Nain, on the road from Jezreel to Nazareth.

SALTICUS CLEMENS, sp. nov.

Female adult, length $2\frac{3}{4}$ lines.

The *cephalothorax* of this Spider is of the ordinary form; its colour is yellow, with a paler patch on the occiput; the upper surface of the caput, or the ocular area, is strongly suffused with black; and there are several slightly converging black streaks on the hind slope; the sides also are a little tinged with brown-black.

Each of the *eyes* of the second (or intermediate) row is rather nearer to that on its side of the hinder row than to the lateral on the same side of the front row, but is in the same straight line. The *legs* and *palpi* are yellow; the former differ but little in length; they are moderately long and strong, and are furnished sparingly with hairs and fine spines. Each tarsus ends with a small claw-tuft. The *falces* are small, conical, and, with the labium, maxillæ, and sternum, also of a yellow colour.

The *abdomen* is of a duller yellow colour than the cephalothorax, and is finely and thickly striated in a longitudinal direction with dusky yellow-brown. A central longitudinal paler band (being freer from these striations) is indistinctly visible on the upperside, and is divided near its fore extremity by a short red-brown longitudinal line, trifid at its hinder extremity, and followed by several dull yellow-brown angular bars or chevrons. The intermediate spaces between these chevrons are perhaps more prominent and observable than the

chevrons themselves, and, together with the space before the outer limbs of the trifid portion of the red-brown line, are perhaps more calculated to catch the eye as the distinctive pattern than if we take the yellow portions to be the ground-colour, and describe the pattern as brown. The abdomen is clothed thinly with short yellowish and greyish hairs, with a few long blackish recurved ones on the fore part of the upperside.

A single adult female of this Spider, which is allied to *S. frontalis* (Walck.), *S. reticulatus* (Bl.), and *A. gambosus* (Sim.), was found on low plants on the plains of the Jordan.

SALTICUS CONVENIENS, sp. nov.

Male adult, length 2 lines.

The *cephalothorax* of this species is massive, but when looked at from above and behind is of the ordinary form; in profile, however, the centre of the ocular area is transversely and perceptibly higher than the rest, which thus slopes pretty sharply forwards to the front row of eyes; it is jet-black, with a large oblong area running from the hinder eyes to the lower hind margin, densely clothed with fine sandy-yellow hairs or coarse pubescence; and the whole of the surface of the cephalothorax, especially the ocular area and the margin of the clypeus, is furnished with prominent black bristly hairs, directed forwards.

The *eyes* of the second row are very minute and difficult to be distinguished; each of them is nearer to the hinder eye on its side than to the lateral on the same side of the foremost row, but is very nearly in the same straight line with these, very slightly, if any thing, within it.

The *legs* are rather long and moderately strong; their relative length is apparently 3, 4, 1, 2; and they are furnished pretty freely with long hairs (both black, white, and yellowish) and with spines; they are of a yellow colour, irregularly marked and spotted with blackish brown; and each tarsus ends with a black claw-tuft.

The *palpi* are neither very long nor strong; their colour is yellow, thickly clothed with short, strong, bristly white hairs; the radial joint is shorter than the cubital, and has its outer extremity produced into a very short but strongish apophysis, bluntish-pointed at its extremity, which is bent downwards; the digital joint is not large; it is of the ordinary form, but is abruptly truncated at its extremity, the truncated part apparently depressed and fringed over thickly with an edging of fine whitish hairs; the palpal organs are highly developed and very prominent, though simple in structure; their hinder portion is nearly globular, and extends backwards to the underside of the cubital joint; their fore part is depressed and somewhat pointed. The *falces* are small, conical, and of a black-brown colour.

The *abdomen* is of the ordinary size and form; its ground-colour is black, but (when not rubbed off) it is densely clothed with a dull reddish sandy-yellow pubescence of short hairs; the hinder part of the upperside has faint indications of a double longitudinal series of alternate paler yellowish and brown-blackish spots; and there are

some long, black, recurved, erect, bristly hairs on the fore part of the upper side.

This plainly marked but distinctly characterized Spider is possibly the male of *A. candidus* (Sim.), which is found in the same locality.

A single adult male was met with among stones at Jerusalem.

SALTICUS COGNATUS, sp. nov.

Male adult, length $2\frac{3}{4}$ lines.

This Spider nearly resembles, and is exceedingly closely allied to, the last-described species, *S. conveniens*; it is, however, larger. The *cephalothorax* is flatter (*i. e.* the slope forwards, from the middle of the ocular area to the front row of eyes, is much less abrupt, the profile line of the caput forming a more gentle and regular curve); the cephalothorax is jet-black, but is entirely without pubescence. This character seemed to be constant in all the ten examples met with, and therefore is not, I think, due to denudation.

The *abdomen* is black, clothed with a reddish-yellow pubescence, similar to that of *S. conveniens*, and very liable to partial denudation, but it was quite unicolorous; in no example was there any trace of either pale or dark spots on the hinder half.

The *palpi* are remarkably similar to those of *S. conveniens*, but the apophysis at the outer extremity of the radial joint seems to be rather stronger and not bent downwards. The general hue and appearance of the *legs* is darker than in the other species named, while in some examples there is a large proportion of white hairs and pubescence on them.

Ten examples of the adult male were found among stones and rocks and dwarf plants near Ain-Ata, on the skirts of the Lebanon.

SALTICUS POLITIVENTRIS, sp. nov.

Male adult, length 2 lines.

This species, though so very different in appearance, is certainly closely allied to both *S. conveniens* and the species next to be described (*S. approximans*).

The *cephalothorax* is large; its highest part is in a line with the two hindmost eyes, whence it slopes both backwards and (more sharply) forwards; there is also a strongish indentation close behind each of those eyes; it is glossy, of the deepest black-brown, with the ocular area quite black, and a broad marginal band of white hairs, occupying nearly the whole of the sides of the cephalothorax, and running completely round it in front close beneath the eyes of the foremost row. Occasionally an example occurs with this band raised above the margin, showing a brown-black band between it and a narrow white marginal line. Each of the eyes of the second row is, if any thing, slightly nearer to the fore lateral eye on its side than to the hind lateral, but is in the same straight line with them.

The *legs* are rather long and tolerably strong; those of the first and second pairs are the strongest, but not excessively so; and they are furnished with hairs (both white, yellowish, and black) and spines;

their colour is yellow, slightly suffused in parts with brownish; and each tarsus terminates with a black claw-tuft.

The *palpi* are of moderate length and strength; they are of a yellow colour, except the humeral joint, which is brown, and the digital, which is still darker; the humeral, cubital, and radial joints are thickly clothed with longish bristly white hairs; the radial is shorter than the cubital, and has its outer extremity produced into a short, strong, reddish-brown, blunt-pointed apophysis, its point bent downwards; the digital is of ordinary form, somewhat obliquely truncated at its fore extremity, the truncated part having a fringe of convergent whitish hairs: the palpal organs are of a deep brown colour, very prominent, but of simple structure; they are of a somewhat globular shape, extending far backwards in a pointed form to the underside of the cubital joint. The *falces* are small, conical, retreating, and of a deep brown colour.

The *abdomen* is short, but of a broad, flattened, oval form, truncated in a somewhat straight line in front, and rounded behind; its upper surface has a corneous appearance, and is of a brilliant glossy dark steel-blue-black colour; the sides and underside are yellowish white, clothed with grey hairs; the sides also have some short longitudinal, blackish, dash-like spots or markings; the steel-blue upperside resembles a sort of plate or covering, which does not extend backwards quite to the spinner.

All the examples met with were males; and it appeared to be the most abundant of the *Saltici* on the plains of the Jordan, among stones and dwarf stunted plants; it was also found in various other parts of Palestine and Syria. I suspect that the *A. canescens* (Sim.), if not the female of *A. conveniens*, must be that sex of the present species, different as it appears to be in the nature of the abdominal integument. Probably *A. canescens* includes the female of both these species, as well as *S. approximans*; for the respective males are very nearly allied in structure, and their females would most likely be very difficult to separate, although the adult males present very good distinctive characters. The present species is also probably closely allied to *S. nitidiventris* (Luc.), but it differs in several strong specific characters.

SALTICUS APPROXIMANS, sp. nov.

Male adult, length 2 lines.

In size and general form this species resembles *S. politiventris*, to which it is certainly nearly allied; but the *cephalothorax* has, besides the broad marginal band of white hairs, a similar white spot behind each lateral eye of the front row, and an oblique, short, white bar or band of the same nature on the occiput behind each eye of the third row.

The *legs* are similar in colour to those of the foregoing species, as are also the *palpi*; but I could not discover any apophysis at the outer extremity of the radial joint; and there appeared to be no truncation at the extremity of the digital, which was of the same colour as the other joints; but the palpal organs are very similar.

The *abdomen* is less flat on the upperside and more pointed behind; and instead of being polished above like that of *S. politiventris*, it is clothed with dull yellowish-brown hairs and a transverse band of scaly white ones on the fore margin; the underside is yellow-white, which unites gradually with the colour of the upperside by small, short, brown streaks.

A single adult male was found on the plains of the Jordan.

SALTICUS ÆRATUS, sp. nov.

Female adult, length 2 lines.

This Spider has the *cephalothorax* of ordinary form; the ocular area is quite flat, and there is a strong indentation behind each of the eyes of the third row; the hind slope is also very abrupt; its colour is deep brown, tinged with reddish, the ocular area being black, and the whole thinly clothed with a fine whitish pubescence and a few fine erect hairs; each of the eyes of the second row is the same distance from the fore lateral as it is from the hind lateral on its side, but is a little within their straight line.

The *legs* are moderate in length and strength, their relative length being 4, 1, 3, 2; they are yellow in colour, clouded, marked, and striped irregularly with blackish brown; they are furnished with hairs and spines, and each tarsus ends with a small claw-tuft.

The *palpi* are yellow, the humeral joint clouded with black-brown, and there is a conspicuous black spot at the base on the foreside of each of the radial and digital joints.

The *abdomen* is oval, and projects greatly over the base of the cephalothorax; its colour is black, thinly clothed with hairs, some of which (especially in front and on the sides) are whitish, and others give it a brassy appearance in different lights; the underside is dull yellowish, with a large central, somewhat quadrangular brown marking.

An example of this species was found among dwarf herbage on the plain of the Jordan.

SALTICUS SPINIGER, sp. nov.

Male adult, length $2\frac{1}{4}$ to $2\frac{1}{2}$ lines.

The *cephalothorax* is rather elongate and flattened; the ocular area does not occupy much more than one third of its entire length; and the hind slope is gradual; it is of a bright reddish yellow-brown colour, margined with black, and the ocular area is strongly clouded with the same; the whole (especially the ocular area) is clothed with golden, grey, and other pubescent hairs, mixed together, and giving it a variegated appearance; a few prominent black hairs, curved forwards, are also scattered over its surface; on the sides of the caput, close beneath the lateral eyes, is a longitudinal series of small blackish tubercles, each surmounted by a short bristle. Each of the eyes of the second row is rather nearer to the hind lateral than to the fore lateral on its side, and is within their straight line.

The *legs* of the first pair are considerably the longest, and the femora, tibiæ, and genua are inordinately strong, compared with the

rest; these legs are of a reddish yellow-brown colour, the others being pale yellowish, tinged with brown; their relative length is 1, 4, 3, 2; and all are thinly furnished with hairs, many of which (especially those on the first pair) are long, fine, and prominent; the metatarsi of the first pair have four (2, 2) short black spines beneath them, and there is another single pair close together, near the extremity, beneath the tibiæ of the same legs. Each tarsus ends with a small claw-tuft.

The *palpi* are short, similar in colour to the legs of the first pair, moderately strong, but of remarkable structure in the radial and digital joints; the cubital and radial joints are both very short; the latter is the shortest, and has a long cylindrical, nearly vertical apophysis issuing from the underside; this apophysis is quite (if not more than) double the length of the joint itself, and terminates rather abruptly in a dark red-brown sharp point; the digital joint is large and long, rather abruptly narrowed forwards, where it is bent downwards; its extremity is truncated; and its convex side is directed outwards; and consequently the palpal organs of each palpus are directed inwards towards each other; they are highly developed and prominent, consisting of a large, somewhat pyriform, corneous lobe (the large end behind), with a small prominence near the middle; a long, strong, black spine issues from the fore extremity of this lobe, on the outer side, and sweeps round backwards with a large bold curve, coiling round on the inner side of the palpal organs, and having its acute filiform point in contact with their extremity, close to its origin; the coil of this spine extends quite to the hinder extremity of the radial joint, and is a very conspicuous character of the species. The *falces* are tolerably long but slender, and rather directed forwards.

The *abdomen* is rather large, of an oval form, slightly flattened; it is of a yellow-brown colour above, clothed with short white hairs in front and on the sides; there are some whitish-yellow markings forwards, an obscure series of broken chevrons behind in the central longitudinal line, and some broken, irregular, oblique stripes on the sides; the underside is whitish.

The *female* resembles the male in colour and markings, which, however, are more distinct than in the latter sex. The relative length of the legs appears to differ in the two sexes, those of the fourth pair being the longest in the female, while those of the first are the longest in the male.

Immature examples of both sexes were found on trunks of olive trees at Hebron and Jerusalem; and in 1864 adults of both were met with on the trunks of palm trees in Egypt. It is from some of the Egyptian examples that the above description has been made; but there is no doubt whatever of the specific identity of the Egyptian and Palestine examples.

SALTICUS FULGENS, sp. nov. (Plate XIV. fig. 17.)

Male adult, length $1\frac{1}{4}$ to $1\frac{1}{2}$ line.

The *cephalothorax* of this beautiful and brilliant little Spider is of

a rather elongated, flattened form, and projects considerably over the base of the falces; its hind slope is moderate; and its colour is deep brown, with a narrow margin of white hairs round the thoracic portion; the ocular area is black, and its surface is minutely rugulose; this part, as well as the thorax, is thinly clothed with squamose hairs of an iridescent yellow and green hue; there is a short longitudinal stripe of white hairs on the middle of the hind slope, and a similar spot behind each eye of the third row; each of the *eyes* of the second row is equidistant between the fore lateral and hind lateral on its side, and in the same straight line; the fore centrals are placed immediately on the margin above the falces.

The *legs* are moderately long and strong; their relative length apparently 4, 3, 1, 2; they are of a clear pale yellow colour, and are furnished thinly with hairs and a very few spines; each tarsus ends with a claw-tuft.

The *palpi* are short, moderately strong, and of a black-brown colour; the radial joint is small and much shorter than the cubital; it is rather pointedly prominent on its fore margin, and has at its outer extremity a very small curved sharp-pointed apophysis; the digital joint is large, and of an oblong-oval form, clothed with white hairs, especially near its extremity; and there are some similar hairs also on the other joints: the palpal organs are prominent, but of simple structure; they project backwards and inwards beneath the radial joint, and have a small curved and pointed spine at their extremity. The *falces* are short, strong, and of a dark yellow-brown colour.

The *abdomen* is of moderate size and of a rather flattish oval form; its colour is dark brown, clothed with short squamose hairs, showing iridescent colours of a brilliant gold, reddish, and green; the upperside and sides have three transverse curved rows of spots formed by bright white hairs, four spots in each row; and there are also two other similar spots in a transverse line immediately above the spinners; eight of these spots form two longitudinal rows on the upperside, from the fore margin to the spinners.

The *female* resembles the male, but is a little larger.

Adult examples of both sexes were found among plants on walls and rocks at various places in Palestine and Syria; also in 1864 in similar situations at Alexandria, Cairo, and in Upper Egypt.

Dendryphantes (Sim.).

SALTICUS DUMICOLUS, sp. nov.

Female adult, length 4½ lines.

This Spider bears considerable resemblance to the female of *S. sanguinolentus*, from which, however, M. Simon considers it to be quite distinct.

On the upperside it is of a more or less deep blackish-brown colour, in some examples mixed and mottled with greyish and yellowish, according as the integument is more or less denuded of hairs.

The *cephalothorax* has two tolerably distinct longitudinal bars of

white hairs, one on either side, including and running backwards from the lateral eyes of all three rows; there is also a white spot on the centre of the caput. The clypeus and sides of the cephalothorax are yellowish; and the former is furnished with long fine whitish hairs. The cephalothorax and also the fore part of the upperside of the abdomen are furnished with long, erect, black hairs.

The *abdomen*, like the cephalothorax, is pretty thickly clothed with hairs, mostly of a yellowish and grey colour; on its upperside are four longitudinal, and more or less perfect, narrow white stripes, in some examples these stripes are formed by a series of more or less confluent dashes or elongate spots; two of these stripes occupy the central portion of the abdominal surface, converge a little as they run backwards, and are nearer together than each is to the lateral stripe on its side. The space between the two central stripes is in most examples darker-coloured than the rest; the lateral stripes are generally bolder though less regular and continuous; the whiteness of the stripes arises from the white hairs with which the yellowish integument beneath is clothed. The underside of the abdomen is yellowish grey, with a broad central longitudinal band of black-brown, near which, on either side, is a more or less distinct longitudinal line of the same colour. The ocular area is much wider than it is long, and the eyes of the second row very nearly equally divide the spaces between the laterals (on either side) of the first and third rows, being a very little nearer to the third than to the first.

The *legs* and *palpi* are thinly furnished with grey, yellowish brown, and black hairs of various lengths, and the former also with longish spines. The legs are yellow, marked and banded with dark blackish red-brown; and each tarsus has a strong claw-tuft at its extremity.

Examples of this species were found in large, regularly woven, and compact silken domiciles, found among the shoots of a dense prickly dwarf shrub growing on the plains of the Jordan near the Dead Sea, and also on the wilds about Nazareth. The male was not discovered. It was no easy matter to capture the females, as, on being disturbed, they escaped quickly from an opening in the silken nest, dropping to the ground among the prickly and impenetrable mazes of the shrub in which the nest was woven.

Menemerus (Sim.).

SALTICUS INDISTINCTUS, sp. nov.

Male adult, length $2\frac{3}{4}$ lines.

The *cephalothorax* is of ordinary form, but large and high, and its hind slope steep; it is of a deep rich shining brown colour, the caput being nearly black. The clypeus and sides are more or less furnished with fine white hairs, those beneath the two large foremost eyes being long and prominent. When looked at from above and behind, the front row of eyes describes a strong curve, the curve directed forwards; the two eyes of the hinder row are very slightly wider apart than the laterals of the front row are from each other; and each of the eyes of the second row is further from the hind lateral than from

the fore lateral on its side, but is in the same straight line with them.

The *legs* are moderately long and strong; their relative length is 1, 4, 2, 3; and they are furnished with hairs, bristles, and slender spines; they are of a dull yellow colour, striped, clouded, and blotched with deep brown; and each tarsus has a terminal claw-tuft. The *palpi* are short, strong, and similar in colour to the legs; they are also furnished thinly with mixed long white, black, and yellowish-red hairs: the cubital and radial joints are of equal length; the latter has its outer extremity produced into a long, tapering, nearly straight apophysis, of a deep shining brown colour towards its extremity, which terminates in a bluntish point or kind of small button-like enlargement; this apophysis is nearly, if not quite, double the length of the joint itself: the digital joint is long and narrow-oval in form, having the appearance of being constricted transversely near the middle. The palpal organs consist of a not very large, but prominent and nearly circular, corneous lobe, situated near the hinder part of the joint to which it is attached. The *falces* are rather long and strong; they are straight but project slightly forwards, and are of a deep rich shining brown colour. The *maxillæ* and *labium* are of ordinary form and deep brown in colour, with pale whitish extremities.

The *abdomen* is of moderate size, oval form, and rather pointed behind; it is of a dull black colour, with one or two minute markings formed by small patches of short white hairs: perhaps the abdomen had become partially denuded of hairs, as, except the above-mentioned patches, it was almost entirely bare; the underside is of a dull and pale yellowish colour, with a broad central longitudinal brown band.

A single example was found among stones and herbage at Jerusalem.

SALTICUS FLAVESCENS, sp. nov.

Female adult, length 4 lines.

This Spider is of ordinary form and structure. The *cephalothorax* has the caput of a black-brown colour, and the thoracic portion dark yellow-brown; the whole is thickly clothed with short yellowish adpressed hairs or coarse pubescence, and on the clypeus are some long fine yellowish-white prominent hairs; on either side, just beneath each eye of the second row, is a curved horn-like tuft composed of a few longer and stronger yellow bristly hairs. The *eyes* are in the ordinary position; and the quadrangular figure they form is broader than long; those of the front row (when looked at from above) form a curve whose convexity is directed forwards; each eye of the second row is, on either side, nearer to the hind lateral than to the fore lateral on its side, and is rather within the straight line formed by them; the eyes of the hinder row are rather nearer together than are the laterals of the front row.

The *palpi* are yellow, furnished with long whitish hairs. The *legs* are moderately strong, but rather short; their relative length is 4, 3,

2, 1; their colour is yellow, and they are furnished with hairs and fine spines, and are (chiefly on the tibiæ, genua, and upper portions of the femora) obscurely banded with dull yellow-brown; each tarsus terminates with a strong black claw-tuft.

The *abdomen* is of a yellowish colour, obscurely marked on the upperside with black-brown markings, of which, on the hinder half, are some irregular transverse and somewhat dentated blackish-brown bars, joining in with some short oblique ones of the same hue on the sides; these markings have two somewhat conspicuous yellowish spots in a transverse line halfway between the middle of the abdomen and the spinners; the whole is thinly clothed with fine yellowish hairs. The spinners are prominent, those of the superior pair being half as long again as those of the inferior.

Adult females were found on the skirts of the Lebanon near Ain-Ata.

Heliophanus (Koch, Sim.).

SALTICUS FACETUS, sp. nov.

Male adult, length 1½ line.

This species is of ordinary form. The *cephalothorax* is jet-black, with some prominent bristly hairs in front, a marginal border of white hairs on the thoracic portion, and some yellowish-green iridescent hairs on the hind slope. The *legs* are moderately long and strong; their colour is brown, becoming paler towards the tarsi; and they are furnished sparingly with hairs and spines, some of the former on their uppersides being of a squamose character.

The *palpi* are of the ordinary general appearance, length, and strength; their colour is black, with white squamose hairs on their uppersides; the humeral joint has a pointed tooth-like prominence on the underside at its hinder extremity, and another strong and much longer apophysis from near its fore extremity on the outer side: this apophysis is directed downwards and somewhat forwards, and is rather abruptly pointed and a little curved inwards; the radial joint is short and has a pointed prominent apophysis beneath it. The palpal organs are prominent, somewhat globular in form, and situated quite at the base of the digital joint.

The *abdomen* is of ordinary form, and is of a deep bottle-green shining black colour, with the fore margin margined with white hairs; four conspicuous spots of white hairs form a quadrangular figure on the hinder half (the two foremost spots are much the largest); and on the sides beneath each of these spots is another of the same nature.

A single adult male was found on low plants at Jerusalem; and both sexes were frequent in similar situations along banks and low walls at Hebron. The *female* is similar in colours and markings to the male.

SALTICUS MORDAX, sp. nov.

Male adult, length 2 lines.

This Spider is larger than the preceding, but resembles it very

nearly in colour and markings. The *abdomen*, however, may be distinguished (if this be a constant character) by the four white spots of hairs on the hinder half of the upperside being stronger, elongated, and the two on either side being almost confluent, forming nearly two parallel longitudinal white bars; the white transverse marginal bar on the fore margin is also broader, straight, and in its length it only extends to the width of the abdomen. The structure of the *palpi*, however, readily distinguishes it from *S. facetus*: the humeral joint has a longer prominence beneath its hinder extremity; and the apophysis at its fore extremity springs more from beneath than from the side of the joint: it is also stronger, and is almost perpendicular, though a little bent, and inclined backwards; its extremity shows a kind of transition from the simple to the bifid point, having a sort of notch or indentation (looking like a small tubercle from some points of view) near its point: this distinguishes it from any other species known to me. The radial joint is shorter than the cubital, and has its outer extremity produced into a tolerably strong blunt-pointed apophysis; and there is a small, sharp, black, tooth-like vertical spine beneath. The digital joint is of a longish narrow oval form. The palpal organs are well developed and greatly resemble those of many others of this group, but are less globular and less prominent than those of the preceding and some other species; they have a small curved projection beneath at their base, and extend backwards on the inner side in the form of a strong prominent blunt point.

A single example was met with on low-growing plants on the plains of the Jordan.

SALTICUS CURVIDENS, sp. nov.

Male adult, length 1½ line.

Of the ordinary general form and appearance of Spiders of this group, the present species differs very decidedly in the structure of the palpi. The white spots and fore marginal bar on the *abdomen* are visible, but are less conspicuous than in either of the two last-described species (possibly this may be due to the specimen having been rubbed accidentally and so lost the white hairs which form those markings). The *legs* are also darker—being black-brown, except the tarsi, which are of a yellow-brown hue. The *palpi* have the humeral joint short and tumid, and apparently without any basal tooth-like prominence; the characteristic apophysis from beneath its fore extremity is long, strong, and produced into a blunt point much bent or hooked inwards; the general direction of this apophysis is nearly perpendicular: the radial joint is very small; it has an apparently cylindrical apophysis of a pale colour projecting forwards on its underside; and from near the base of this there projects outwards another, small, curved, black, sharp-pointed one; the digital joint is of ordinary form and size, and has a broad band on its surface thickly clothed with white squamose hairs. The palpal organs are of a more irregular form than those of the last two species; they have a strong blunt horn-like projection from near their base on the inner side, a short

vertical one beneath their fore extremity (from which there issues also a strong, black, curved, spine-like apophysis directed forwards); and their hinder portion extends far backwards in a pointed form at the extremity, beneath the radial and the fore part of the cubital joints.

A single adult male found on low plants on the plains of the Jordan.

SALTICUS DENTATIDENS, sp. nov.

Male adult, length 2 lines.

This species is closely allied to *S. mordax* (anteà, p. 344), but the white spots and fore marginal bar on the *abdomen* are far less marked. The humeral joint of the palpus has a tooth-like prominence beneath its base; and the apophysis near its fore extremity springs more from the side and projects more outwards than in that species; it is also stronger, rather more curved and more distinctly bifid at its extremity, owing to a decided, though small, prominent tooth-like projection on its inner side near the extreme point: like *S. mordax*, the radial joint has its outer extremity produced; but the apophysis is rather smaller and less obtusely pointed. The digital joint and palpal organs are very similar to those of the species mentioned.

Examples of this species (which M. Simon considers to be a very distinct one) were found on the plains of the Jordan, on the road between Jerusalem and Nazareth, on Mount Carmel, and near Damascus.

SALTICUS FURCATUS, sp. nov.

Male adult, length 2 lines.

This Spider is entirely black, except that the cephalothorax has a narrow marginal border of white hairs, and on the abdomen is a faint representation of the fore-marginal border of similar hairs (characteristics of many species of this group); the tarsi and metatarsi of the legs are brownish yellow. The characteristic apophysis from beneath the fore extremity of the humeral joint of the palpus is very distinctly bifid in a furcate form, the hinder limb of the furcation being rather the shortest, straightest, and least strong; the radial joint has a rather slender, sharp-pointed, hooked, black spine projecting outwards from beneath; the palpal organs extend backwards and inwards in a very strong and obtusely prominent form, and they have also, beneath their hinder extremity, a curved, corneous prominent, blunt-pointed projection: there is also a small conical tooth-like prominence beneath the hinder extremity of the humeral joint.

It is possible that the abdomen of this Spider may have been accidentally denuded of the white hairs which in many species form the characteristic spots. It is evidently nearly allied to *Heliophanus melinus* (L. Koch), of which the adult male is unknown to me; but M. Simon is of opinion that it is distinct.

A single example was met with on low plants at the village of Nain.

SYSTEMATIC LIST OF THE SPIDERS OF PALESTINE AND SYRIA, WITH REFERENCES TO THE PREVIOUS PAPER.

Ischnocolus syriacus (Auss.), p. 215.
Idiops syriacus (Cambr.), p. 216.
Filistata attalica (Koch), p. 216.
—— *albimaculata*, sp. nov., p. 216, Plate XIII. fig. 1.
—— *hirsuta*, sp. nov., p. 217.
Miltia amaranthina (Luc.), p. 218.
—— *diversa*, sp. nov., p. 219.
Œcobius teliger, sp. nov., p. 221, Plate XIII. fig. 8.
—— *affinis*, sp. nov., p. 221.
—— *trimaculatus*, sp. nov., p. 219, Plate XIII. fig. 7.
—— *albipunctatus*, sp. nov., p. 222.
Clotho limbata (Koch), p. 222.
—— *septempunctata*, sp. nov., p. 222.
Segestria perfida (Walck.), p. 223.
Ariadne insidiatrix (Sav.), p. 223.
Dysdera westringii, sp. nov., p. 223, Plate XIII. fig. 2.
Oonops punctatus, sp. nov., p. 223, Plate XIV. fig. 3a.
Gnaphosa ripariensis, sp. nov., p. 224, Plate XV. fig. 1.
—— *plumalis*, sp. nov., p. 225, Plate XV. fig. 3.
—— *excerpta*, sp. nov., p. 226, Plate XV. fig. 4.
—— *cambridgii*, sp. nov., p. 227, Plate XV. fig. 2.
—— *lutata*, sp. nov., p. 228, Plate XV. fig. 7.
—— *kochii*, sp. nov., p. 229, Plate XV. fig. 6.
—— *conspersa*, sp. nov., p. 230, Plate XV. fig. 5.
—— *palæstina*, sp. nov., p. 231, Plate XV. fig. 8.
Drassus lapidicolens (Walck.), p. 232.
—— *troglodytes* (Koch), p. 232.
—— *morosus*, sp. nov., p. 232, Plate XV. fig. 9.
—— *lutescens* (Koch), p. 233.
—— *tenerrimus*, sp. nov., p. 233, Plate XV. fig. 10.
—— *mundulus*, sp. nov., p. 234, Plate XV. fig. 11.
—— *dalmatensis* (L. Koch), p. 235.
—— *lacertosus*, sp. nov., p. 235, Plate XV. fig. 12.
—— *senilis*, sp. nov., p. 236, Plate XV. fig. 13.
—— *invalidus*, sp. nov., p. 237, Plate XV. fig. 14.
—— *nanus*, sp. nov., p. 237, Plate XV. fig. 15.
—— *infumatus*, sp. nov., p. 238, Plate XV. fig. 16.
—— *scrutatus*, sp. nov., p. 239, Plate XV. fig. 16a.
—— *omissus*, sp. nov., p. 239, Plate XV. fig. 17.
—— *unicolor*, sp. nov., p. 240, Plate XV. fig. 18.
Melanophora læta, sp. nov., p. 241, Plate XV. fig. 19.
—— *picina*, sp. nov., p. 242, Plate XVI. fig. 20.
—— *carbonaria*, sp. nov., p. 242, Plate XVI. fig. 21.
—— *tragica*, sp. nov., p. 243, Plate XVI. fig. 22.
—— *helvola*, sp. nov., p. 243, Plate XVI. fig. 23.
—— *scutata*, sp. nov., p. 244, Plate XVI. fig. 24.
—— *ursina*, sp. nov., p. 245, Plate XVI. fig. 25.
—— *inaurata*, sp. nov., p. 246, Plate XVI. fig. 26.
—— *pedestris* (Koch), p. 247.
—— *caucasia* (L. Koch), p. 247, Plate XVI. fig. 27.
—— *gracillima*, sp. nov., p. 247, Plate XVI. fig. 28.
—— *carmeli*, sp. nov., p. 248, Plate XVI. fig. 29.
Micaria ignea, sp. nov., p. 248, Plate XVI. fig. 30.
—— *trifasciata*, sp. nov., p. 249, Plate XVI. fig. 31.
—— *septempunctata*, sp. nov., p. 250, Plate XVI. fig. 32.
—— *nuptialis*, sp. nov., p. 250, Plate XVI. fig. 33.
—— *albimana*, sp. nov., p. 251, Plate XVI. fig. 34.
Phrurolithus flavipes, sp. nov., p. 252, Plate XVI. fig. 35.

Clubiona straminea, sp. nov., p. 252, Plate XVI. fig. 38.
—— *gilva*, sp. nov., p. 253, Plate XVI. fig. 39.
—— *contaminata*, sp. nov., p. 254, Plate XVI. fig. 40.
—— *accentuata* (Walck.), p. 254.
Cheiracanthium annulipes, sp. nov., p. 254, Plate XVI. fig. 36.
—— *tenuissimum* (L. Koch), p. 255.
—— *seidlitzii* (id.), p. 255.
—— *mildei* (id.), p. 255.
—— *anceps*, sp. nov., p. 255, Plate XVI. fig. 37.
—— *pelasgicum* (L. Koch), p. 256.
Trachelus minor, sp. nov., p. 256, Plate XVI. fig. 41.
Hecaërge maculata, sp. nov., p. 257.
—— *opiniosa*, sp. nov., p. 258, Plate XVI. fig. 43.
Agræca lycosiformis, sp. nov., p. 258, Plate XVI. fig. 42.
Palpimanus hæmatinus (Koch), p. 260.
Eresus acanthophilus (Duf.), p. 260.
—— *mœrens* (Koch), p. 261.
—— *ruficapillus* (id.), p. 261.
Dictyna benigna (Bl.), p. 261.
—— *variabilis* (Koch), p. 261.
—— *consecuta*, sp. nov., p. 261.
—— *puta*, sp. nov., p. 261.
—— *innocens*, sp. nov., p. 262.
Amaurobius putus (Cambr.), p. 262.
—— *simplex*, sp. nov., p. 262.
—— *distinctus*, sp. nov., p. 263.
—— *indistinctus*, sp. nov., p. 264.
—— *ruficeps*, sp. nov., p. 264.
Lachesis perversa (Sav.), p. 265.
—— *meadii*, sp. nov., p. 265, Plate XIII. fig. 4.
—— *blackwallii*, sp. nov., p. 266, Plate XIII. fig. 5.
Palæstina (n. gen.) *dentifera*, sp. nov., p. 268.
—— *expolita*, sp. nov., p. 269, Plate XIII. fig. 6.
—— *sexoculata*, sp. nov., p. 270.
Enyo græca (Koch), p. 270.
—— *luctuosa*, sp. nov., p. 270.
—— *lutipes*, sp. nov., p. 272.
—— *atricep*, sp. nov., p. 271.
Cithæron (n. gen.) *prædonium*, sp. nov., p. 273.
Agelena syriaca (Koch), p. 273.
Textrix inornata, sp. nov., p. 274.
—— *puta*, sp. nov., p. 274.
Tegenaria intricata (C. Koch), p. 274.
—— *annulipes*, sp. nov., p. 275.
Hersiliada simonii, sp. nov., p. 275, Plate XIV. fig. 9.
Scytodes thoracica (Walck.), p. 276.
Loxoscelis rufescens (Duf.), p. 277.
Pholcus rivulatus (Sav.), p. 277.
Ariamne longicaudata, sp. nov., p. 277, Plate XIV. fig. 11A.
Argyrodes epeiræ (Sim.), p. 279.
—— *syriaca*, sp. nov., p. 279, Plate XIII. fig. 10.
Theridion lutipes (Cambr.), p. 280.
—— *spirifer* (id.), p. 280.
—— *denticulatum* (Walck.), p. 280.
—— *varians* (Walck.), p. 280.
—— *simile* (Koch), p. 281.
—— *venustum*? (Walck.), p. 281.
—— *albocinctum* (Luc.), p. 281.
—— *flavomaculatum* (Luc.), p. 281.
—— *apicatum*, sp. nov., p. 281.
—— *acuminatum* (Luc.), p. 281.

Theridion particeps, sp. nov., p. 282.
—— *scriptum*, sp. nov., p. 283.
—— *inscriptum*, sp. nov., p. 284.
—— *erigoneforme*, sp. nov., p. 284.
—— *conspicuum*, sp. nov., p. 285, Plate XIII. fig. 11.
Ero tuberculata (Koch), p. 287.
Ctenophora monticola (Bl.), p. 287.
Lathrodectus crebus (Sav.), p. 287.
—— *pallidus*, sp. nov., p. 287.
—— *argus* (Sav.), p. 288.
—— *hamatus* (Koch), p. 228.
Erigone rupestris (Koch), p. 289.
—— *incauta*, sp. nov., p. 289.
—— *inexpedibilis*, sp. nov., p. 289.
—— *dentata* (Reuss-Wider), p. 290.
—— *femoralis*, sp. nov., p. 291.
—— *dentipalpis* (Westr.), p. 291.
—— *spinosa*, sp. nov., p. 292, Plate XIII. fig. 12.
—— *pastoralis*, sp. nov., p. 292.
—— *pavida*, sp. nov., p. 293, Plate XIV. fig. 22.
Linyphia congener, sp. nov., p. 294.
—— *albuloides*, sp. nov., p. 293.
—— *leprosa* (Ohl.), p. 294.
—— *frutetorum* (Koch), p. 294.
Pachygnatha listeri? (Sund.), p. 294.
—— ? *mandibulare* (Luc.), p. 294.
Tetragnatha molesta, sp. nov., p. 295.
—— *minitabunda*, sp. nov., p. 296.
—— *perlongipes*, sp. nov., p. 296.
Epeïra herii (Hahn), p. 298.
—— *inconveniens*, sp. nov., p. 298.
—— *neta*, sp. nov., p. 298.
—— *incongrua*, sp. nov., p. 299.
—— *cucurbitina* (Walck.), p. 299.
—— *lucina* (Sav.), p. 299.
—— *antriada* (Walck.), p. 300.
—— *apoclisa* (id.), p. 300.
—— *adianta* (id.), p. 300.
—— *perplicata*, sp. nov., p. 300.
—— *solers* (Walck.), p. 301.
—— *circe* (Sav.), p. 301.
—— *opuntiæ* (Duf.), p. 301.
Argiope sericea (Sav.), p. 301.
—— *epeïroides*, sp. nov., p. 301.
Uloborus walckenaërius (Latr.), p. 302.
—— *plumipes* (Luc.), p. 303.
Thomisus edax, sp. nov., p. 303.
—— *cristatus* (Bl.), p. 303.
—— *tristrami*, sp. nov., p. 304, Plate XIV. fig. 16.
—— *græcus*? (Koch), p. 305.
—— *confluens* (Koch), p. 305.
—— *rigidus*, sp. nov., p. 305.
—— *claviger*, sp. nov., p. 306.
—— *varius*, sp. nov., p. 303.
—— *rectilineus*, sp. nov., p. 306.
—— *diana* (Sav.), p. 306.
—— *rotundatus* (Walck.), p. 306.
—— *plorator*, sp. nov., p. 306.
—— *buffonii* (Sav.), p. 307.
—— *setiger*, sp. nov., p. 307, Plate XIV. fig. 15.
—— *lateralis* (Koch), p. 308.

Thomisus abbreviatus (Koch), p. 308.
—— *peronii* (Sav.), p. 308.
—— *spinifer*, sp. nov., p. 308, Plate XIV. fig. 14.
Philodromus thorellii, sp. nov., p. 309.
—— *albini* (Sav.), p. 310.
—— *fabricii* (id.), p. 310.
—— *setigerus*, sp. nov., p. 310.
—— *medius*, sp. nov., p. 311.
Sparassus walckenaërius (Sav.), p. 311.
—— *linnæi* (id.), p. 312.
—— *ornatus* (Walck.), p. 312.
—— *smaragdulus* (id.), p. 312.
Heteropoda kochii, sp. nov., p. 312, Plate XIV. fig. 13.
Selenops omalosoma (Duf.), p. 314.
Pasithea virescens, sp. nov., p. 314.
Oxyopes gentilis (Koch), p. 314.
—— *lineatus* (Walck.), p. 314.
—— *sobrinus*, sp. nov., p. 314.
—— *optabilis*, sp. nov., p. 315.
Lycosa (*Tarentula*) *grisea* (Koch), p. 315.
—— (——) *apuliæ* (Walck.), p. 316.
—— (——) *narbonnensis* (Walck.), p. 316.
—— *trucidatoria* (Walck.), p. 316.
—— *sagittata* (Koch), p. 316.
—— *nigra* (Koch), p. 316.
—— *proxima* (id.), p. 316.
—— *cambrica* (Bl.), p. 316.
—— *piratica* (id.), p. 316.
—— *albimana* (Koch), p. 316.
—— *dissonans*, sp. nov., p. 316.
—— *ejusmodi*, sp. nov., p. 317.
—— *deserta*, sp. nov., p. 318.
—— *effera*, sp. nov., p. 318.
—— *fidelis*, sp. nov., p. 319.
Ctenus syriacus, sp. nov. p. 320.
Dolomedes consocius, sp. nov., p. 320.
Salticus (*Attus*) *sanguinolentus* (Koch), p. 321.
—— (——) *hæmorrhoicus* (Koch), p. 321.
—— (——) *castaneus* (Sim.), p. 321.
—— (——) *cephalotes* (id.), p. 321.
—— (——) *diagonalis* (id.), p. 321.
—— (——) *lævigatus* (id.), p. 322.
—— (——) *albobimaculatus* (Luc.), p. 322.
—— (——) *ostrinus* (Sim.), p. 322.
—— (——) *quinquepartitus* (Walck.), p. 322.
—— (——) *monardi* (Luc.), p. 322.
—— (——) *capreolus* (L. Koch), p. 322.
—— (——) *candidus* (Sim.), p. 322.
—— (——) *affinis* (Luc.), p. 322.
—— (——) *arenicolor* (Sim.), p. 322.
—— (——) *latifasciatus* (id.), p. 322, Plate XIV. fig. 18.
—— (——) *fasciatus* (Hahn), p. 322.
—— (——) *lineatus* (Koch), p. 323.
—— (——) *fulvaster* (Sim.), p. 323.
—— (——) *bresnieri* (Luc.), p. 323.
—— (——) *semiater* (Sim.), p. 323.
—— (——) *canescens* (Koch), p. 323.
—— (——) *gambosus* (Sim.), p. 323, Plate XIV. fig. 21.
—— (——) *paykullii* (Sav.), p. 323.
—— (——) *vaillantii* (Luc.), p. 323.
—— (——) *multipunctatus* (Sim.), p. 323.

Salticus (*Attus*) *regillus* (L. Koch), p. 323.
—— (*Plexippus*) *adansonii* (Sav.), p. 324.
—— (*Calliethera*) *tenerus* (Koch), p. 324.
—— (——) *tricinctus* (id.), p. 324.
—— (——) *infimus* (Sim.), p. 324.
—— (*Menemerus*) *vigoratus* (Koch), p. 324.
—— (*Heliophanus*) *melinus* (L. Koch), p. 324.
—— (——) *todillus* (Sim.), p. 324, Plate XIV. fig. 19.
—— (*Rhanis*) (*Attus*) *insignis*, sp. nov. p. 324.
—— (*Attus*) *putus*, sp. nov., p. 326.
—— (——) *delectus*, sp. nov., p. 326.
—— (——) *devorans*, sp. nov., p. 327.
—— (——) *heliophanoïdes*, sp. nov., p. 328.
—— (——) *epularis*, sp. nov., p. 329.
—— (——) *simonii*, sp. nov., p. 329.
—— (——) *particeps*, sp. nov., p. 330.
—— (——) *staintonii*, sp. nov., p. 331, Plate XIV. fig. 20.
—— (——) *congener*, sp. nov., p. 332.
—— (——) *patagiatus*, sp. nov., p. 332.
—— (——) *nepos*, sp. nov., p. 333.
—— (——) *pascualis*, sp. nov., p. 334.
—— (——) *clemens*, sp. nov., p. 335.
—— (——) *conveniens*, sp. nov., p. 336.
—— (——) *cognatus*, sp. nov., p. 337.
—— (——) *politiventris*, sp. nov., p. 337.
—— (——) *approximans*, sp. nov., p. 338.
—— (——) *æratus*, sp. nov., p. 339.
—— (——) *spiniger*, sp. nov., p. 339.
—— (——) *fulgens*, sp. nov., p. 340, Plate XIV. fig. 17.
—— (*Dendryphantes*) *dumicolus*, sp. nov., p. 341.
—— (*Menemerus*) *indistinctus*, sp. nov., p. 342.
—— (——) *flavescens*, sp. nov., p. 343.
—— (*Heliophanus*) *facetus*, sp. nov., p. 344.
—— (——) *mordax*, sp. nov., p. 344.
—— (——) *curvidens*, sp. nov., p. 345.
—— (——) *dentatidens*, sp. nov., p. 346.
—— (——) *furcatus*, sp. nov., p. 346.

EXPLANATION OF THE PLATES.

Plate XIII.

Fig. 1. *Filistata albimaculata* ♂, p. 216.
a, palpus; *b*, fore part of cephalothorax, and eyes; *c*, natural length of Spider; *d*, Spider in profile without legs; *e*, female without legs or palpi.

2. *Dysdera westringii* ♂, p. 223.
a, palpus; *e*, ditto in another position; *b*, fore part of cephalothorax, and eyes; *c*, profile of cephalothorax without legs; *d*, natural length of Spider.

3. *Gnaphosa cambridgii* ♂, p. 227.
a, *b*, palpus in two positions; *c*, natural length of Spider; *d*, fore part of cephalothorax, and eyes; *e*, genital aperture of female.

4. *Lachesis meadii* ♂, p. 265.
a, female without legs; *b*, *c*, palpus of male in two positions; *d*, genital aperture of female; *e*, profile of male without legs; *f*, eyes; *g*, natural length of Spider.

5. *Lachesis blackwallii* ♂ (of natural size), p. 266.
a, *b*, palpus in two positions; *c*, profile without legs; *d*, underside of

cephalothorax, showing maxillæ and labium; *e*, fore part, showing the eyes.

Fig. 6. *Palæstina expolita* ♂, p. 269.
a, *b*, palpus in two positions; *c*, eyes and falces; *d*, natural length of Spider, and profile without legs; *f*, extremity of tarsus, showing terminal claws.

7. *Œcobius trimaculatus* ♂, p. 219.
a, *b*, palpus of male in two positions; *c*, natural length of female; *d*, cephalothorax and eyes of male; *e*, natural length of male; *f*, female without legs.

8. *Œcobius teliger* ♂, p. 221.
a, palpus; *b*, cephalothorax and eyes; *c*, natural length of Spider.

10. *Argyrodes syriaca* ♂, p. 279.
a, female without legs; *b*, palpus of male; *c*, profile of male; *d*, natural length of female; *e*, natural length of male.

11. *Theridion conspicuum* ♂, p. 285.
a, palpus; *b*, leg of first pair; *c*, profile without legs; *d*, natural length of Spider.

12. *Erigone spinosa* ♂, p. 292.
a, *b*, palpus in two positions; *c*, profile without legs; *d*, natural length of Spider.

PLATE XIV.

9. *Hersiliada simonii* ♂, p. 275.
a, palpus; *b*, eyes and falces from in front; *c*, natural length of Spider.

3A. *Oonops punctatus* ♂, p. 223.
a, profile without legs; *b*, eyes; *c*, *e*, *f*, palpus in different positions; *d*, natural length of Spider.

11A. *Ariamne longicaudata* ♂, p. 277.
a, cephalothorax and abdomen, upper side; *b*, maxillæ and labium; *c*, Spider in profile; *m*, ditto more enlarged; *e*, *f*, extremity of abdomen in two positions; *g*, *h*, eyes in two positions; *k*, palpus; *n*, natural length of Spider.

13. *Heteropoda kochii* ♂ (of natural size), p. 312.
a, profile without legs; *b*, *c*, palpus in two positions; *d*, maxillæ, labium, and sternum; *e*, eyes.

14. *Thomisus spinifer* ♂, p. 308.
a, profile without legs; *b*, eyes and falces from in front; *c*, palpus; *d*, natural length of Spider.

15. *Thomisus setiger* ♂, p. 307.
a, profile without legs; *b*, *c*, palpus in two positions; *d*, natural length Spider.

16. *Thomisus tristrami* ♂, p. 304.
a, *b*, palpus in two positions; *c*, natural length of Spider.

17. *Salticus fulgens* ♂, p. 340.
a, palpus; *b*, natural length of Spider.

18. *Salticus latifasciatus* ♂, p. 322.
a, *c*, palpus in two positions; *d*, Spider in profile; *b*, natural length of Spider.

19. *Salticus todillus* ♂, p. 324.
a, palpus; *b*, Spider in profile; *c*, natural length of Spider.

20. *Salticus staintonii* ♂, p. 321.
a, palpus; *b*, leg of first pair; *c*, caput and eyes; *d*, natural length of Spider.

21. *Salticus gambosus* ♂, p. 323.
a, palpus; *b*, leg of first pair; *c*, natural length of Spider.

22. *Erigone* (*Walckenaëra*) *pavida* ♂, p. 293.
a, Spider in profile; *b*, front view of cephalothorax and eyes; *c*, palpus; *d*, natural length of Spider.

PLATE XV.

Fig. 1. *Gnaphosa riparíensis*, p. 224.
a, genital aperture of female; *b*, palpus of male; *c*, digital and radial joints of palpus, with palpal organs.
2. *Gnaphosa cambridgii*, p. 227.
a, digital and radial joints of palpus of male from beneath, showing palpal organs; *b*, palpus in profile, from outer side; *c*, genital aperture of female.
3. *Gnaphosa plumalis*, p. 225.
a, palpus of male in profile from outer side; *b*, digital and radial joints from beneath, showing palpal organs; *c*, genital aperture of female.
4. *Gnaphosa excerpta*, p. 226.
Palpus of male from outer side.
5. *Gnaphosa conspersa*, p. 230.
a, palpus of male from beneath in front; *b*, genital aperture of female.
6. *Gnaphosa kochii*, p. 229.
Palpus of male from beneath in front.
7. *Gnaphosa lutata*, p. 228.
Palpus of male; digital and radial joints, from beneath, showing palpal organs.
8. *Gnaphosa palæstina*, p. 231.
Genital aperture of female.
9. *Drassus morosus*, p. 232.
Palpus of male in profile, from outer side.
10. *Drassus tenerrimus*, p. 233.
a, digital and radial joints of palpus of male, from underside; *b*, ditto ditto in profile, from outer side.
11. *Drassus mundulus*, p. 234.
b, digital and radial joints of palpus of male, from underside; *a*, apophysis at outer extremity of radial joint; *c*, genital aperture of female.
12. *Drassus lacertosus*, p. 235.
a, digital and radial joints of palpus of male, showing palpal organs; *b*, palpus in profile.
13. *Drassus senilis*, p. 236.
Genital aperture of female.
14. *Drassus invalidus*, p. 237.
Digital and radial joints of palpus of male.
15. *Drassus nanus*, p. 237.
Genital aperture of female.
16. *Drassus infumatus*, p. 238.
a, digital and radial joints of palpus of male, from underside; *b*, apophysis at outer extremity of radial joint; genital aperture of female.
16*a*. *Drassus scrutatus*, p. 239.
a, palpus of male, underside; *b*, ditto, upper side.
17. *Drassus omissus*, p. 239.
Genital aperture of female.
18. *Drassus unicolor*, p. 240.
Genital aperture of female.
19. *Melanophora læta*, p. 241.
a, digital and radial joints of palpus of male, from underside; *b*, apophysis at outer extremity of radial joint.

PLATE XVI.

20. *Melanophora picina*, p. 242.
Genital aperture of female.
21. *Melanophora carbonaria*, p. 242.
a, digital and radial joints of palpus of male, from underside; *b*, apophysis at outer extremity of radial joint.

Fig. 22. *Melanophora tragica*, p. 243.
Digital and radial joints of palpus of male, from underside.
23. *Melanophora helvola*, p. 243.
Digital and radial joints of palpus of male, from underside.
24. *Melanophora scutata*, p. 244.
a, digital and radial joints of palpus of male, from underside; *b*, palpus in profile, from outer side.
25. *Melanophora ursina*, p. 245.
Genital aperture of female.
26. *Melanophora inaurata*, p. 246.
a, digital and radial joints of palpus of male, from underside; *b*, genital aperture of female.
27. *Melanophora caucasia*, p. 247.
a, digital and radial joints of palpus of male, from beneath; *b*, apophysis at outer extremity of radial joint.
28. *Melanophora gracillima*, p. 247.
a, palpus of male in profile, from outer side; *b*, digital and radial joints, from beneath; *c*, genital aperture of female.
29. *Melanophora carmeli*, p. 248.
a, digital and radial joints of palpus of male, from underside; *b*, palpus in profile, from outer side.
30. *Micaria ignea*, p. 248.
Genital aperture of female.
31. *Micaria trifasciata*, p. 249.
Genital aperture of female.
32. *Micaria septem-punctata*, p. 250.
Palpus of male, profile, from outer side.
33. *Micaria nuptialis*, p. 250.
a, digital and radial joints of palpus of male, from underside; *b*, apophysis at outer extremity of radial joint.
34. *Micaria albimana*, p. 251.
Genital aperture of female.
35. *Phrurolithus flavipes*, p. 252.
Genital aperture of female.
36. *Cheiracanthium annulipes*, p. 254.
Genital aperture of female.
37. *Cheiracanthium anceps*, p. 255.
Genital aperture of female.
38. *Clubiona straminea*, p. 252.
a, digital and radial joints of palpus of male, from underside; *b*, apophysis at outer extremity of radial joint.
39. *Clubiona gilva*, p. 253.
Genital aperture of female.
40. *Clubiona contaminata*, p. 254.
Genital aperture of female.
41. *Trachelas minor*, p. 256.
a, palpus of male, profile, from outer side; *b*, digital and radial joints, from beneath; *c*, genital aperture of female.
42. *Agræca lycosiformis*, p. 258.
a, palpus of male, from underside; *b*, digital joint, from upperside; *c*, radial joint, from upperside; *d*, palpus in profile, from inner side; *e*, genital aperture of female.
43. *Hecaërge opiniosa*, p. 258.
Genital aperture of female.

March 5, 1872.

John Gould, Esq., F.R.S., in the Chair.

An extract was read from a letter addressed to the Secretary by Mr. Walter T. Scott, C.M.Z.S., dated Vale of Herbert, Cardwell, Queensland, December 4, 1871. Mr. Scott wrote as follows of the supposed "Native Tiger" of Queensland, concerning which Mr. Sclater had previously communicated the evidence given by Mr. Sheridan (see P. Z. S. 1871, p. 629):—

"As to the Tiger, I am inclined to think there really is some large carnivorous animal as yet undescribed in this neighbourhood. A Mr. Hull, Licensed Surveyor, was lately at work with a party of five men, surveying on the Murray and Mackay rivers, north of Cardwell. They were lying in their tents one night between eight and nine o'clock, when they were all startled by a loud roar close to the tents. They seized their guns and carefully reconnoitred; but the animal had departed. In the morning they found the tracks of the unknown visitor, of which Mr. Hull took the measurements and a rough sketch. I send you part of a leaf of Mr. Hull's field-book,



Footprint of "Native Tiger," reduced one half.

containing the original sketch—and also his drawing of the track, of the natural size. Mr. Hull assures me that the drawing was a very faithful one, the soft ground having taken the impression with all its details. I have also examined some of the men who were with Mr. Hull. They all tell the same story, and say they heard the animal three nights in succession.

I think that I have already mentioned to you that a bullock-driver of ours, as long ago as 1864, came in one day with a story that he had seen a Tiger; but as he was a notorious liar we did not believe a word of it at the time. Yet it is possible he may really have seen the same animal, which must I think, from its claws, be allied to the Tasmanian Thylacine (*Thylacinus cynocephalus*)."

The following papers were read:—

1. On the Occurrence of *Falco barbarus* and *Cypselus pallidus* on the Continent of Europe. By Howard Saunders, F.Z.S.

[Received March 4, 1872.]

In the excellent account of *Falco barbarus* given by Mr. O. Salvin in 'The Ibis,' 1859, p. 184 *et seq.*, he recommends that a look-out should be kept for it in Spain; and I have now great pleasure in exhibiting an example of this miniature Peregrine obtained near Granada, Spain, in January 1871. It appears to be a bird of the year, and proved to be a female on dissection. As Messrs. Salvin and Brodrick observe in their 'Falconry in the British Isles,' p. 101, "although smaller by nearly one fourth than the true Peregrine, it has the organs of destruction, such as the beak, feet, and talons, fully as large." Indeed in the present specimen the middle toe is *very nearly as long* as that of a magnificent adult female Peregrine, and *rather longer* than that of an adult male, her mate, shot near Seville, and rivalling in size the largest northern specimens. As Mr. Salvin remarks, the small stature, powerful feet and claws, and ruddy under plumage of *Falco barbarus* are its best characteristics.

In 'The Ibis,' 1870, p. 445, Capt. G. E. Shelley described *Cypselus pallidus* as new, from a specimen he had obtained in Egypt, where it would appear to take the place of *Cypselus apus*. He subsequently identified with this species specimens brought by Major Irby from Tangiers; and that gentleman further remarked that he had seen it in Spain. I am not aware that he has hitherto been successful in obtaining specimens in the Peninsula, and have therefore great pleasure in exhibiting a solitary specimen obtained at Granada on the 28th May, 1870, and sent to me along with a number of the common species, from which it may be distinguished by its lighter colour, white throat, and lighter forehead. From the date, it was probably breeding.

2. Notes on an Ostrich lately living in the Society's Collection. By A. H. Garrod, B.A., Prosector to the Society, and Frank Darwin, B.A.

[Received March 5, 1872.]

A male Ostrich (*Struthio camelus*) has been in the Society's Gardens since April 1869, and was quite healthy until last October, when its appetite began to fail, and it did not take kindly to its food from that time until its death on the 6th ult. In September last the keeper noticed on several occasions that after running about as it was accustomed to do in play, it turned giddy and apparently

tripped, but never quite fell. For the last four months it had lost flesh gradually. Whenever any fresh food was offered it, it would take a little and then refuse any more, and would do thus, however many new things were presented to it.

It had suffered from diarrhœa more or less ever since October, the excrement having a yellowish-green colour.

Latterly it had been nearly continually in the sitting position, and would stand very unwillingly. It also frequently rubbed its head and eyes with its foot, as if something was irritating it there.

In the post mortem examination very little structural disease was found; and the cause of death is more probably connected with the contents of the stomach rather than with any other agency.

There was more than half a gallon of stones in the stomach: most of them were about the size of cob-nuts or peas; and they fully dilated the organ and pulled it down abnormally. Mixed up with these stones were numerous copper coins and pieces of coins in a much worn state. There were two pennies and fifteen halfpence; and very few showed the least trace of the stamp they had previously borne, and those only by an oblique light, the difference in density of the metal, produced by the stamping, having caused them to wear unevenly. Most of them were slightly curved, being meniscoid in form. They were all highly polished and not in the least corroded. Many were in pairs, with a layer of softish green matter, about $\frac{1}{20}$ of an inch thick, interposed. The chips of coins were very numerous and of all sizes below that of the coins themselves. No silver was found, and nothing else except a glove-button and a nut, the latter being at the bottom of the œsophagus.

All the contents of the stomach were of a green colour; and two small boluses of hay which it contained were tinged deeply with green.

Four more coins, deeply corroded and greenish black, were found in one of the intestinal cæca, together with a few stones. There were also a few stones in the other cæcum; and the mucous membrane of both cæca was congested and unhealthy in appearance, which was not the case in the stomach to any extent.

There were no symptoms of jaundice, which frequently accompanies copper poisoning. The liver appeared healthy, except that scattered about were a few dense white lumps about the size of peas, mostly near the surface: it weighed 3 lb. 9 oz. No gall-bladder was present.

The spleen was very small, and altogether weighed just under 2 oz. There was very little healthy tissue preserved, it mostly consisting of spheroidal dense masses of matter which were about the size of chestnuts, and by protruding beyond the general surface produced an appearance of knobs. These masses, on cutting through the capsule, separated entirely, and were then seen to be rough and altogether very like urinary calculi; they were of a fawn-colour. The organ was situated nearly in the middle line, just above the kidneys.

The heart weighed 1 lb. 7 oz., and gave origin to two carotid arteries, one from each main branch, which ran to the head, a distance of about 3 feet 6 inches, side by side, in front of the cervical vertebræ, in the groove formed by the anteriorly projecting processes

of those bones; and they never showed any tendency to unite or cross one another. They were thickly covered by the anterior cervical muscles, and sent off symmetrical branches *.

Superficially on each side of the neck ran a vein with the pneumogastric nerve; but that on the left side was not bigger than a crow-quill, while that on the right had a diameter at the lower part of the neck of two thirds of an inch. This condition is constant in many birds.

This right (practically the only) jugular vein, after coursing about half or a little more up the neck, sent two branches to the head, the second running in the middle line, just behind the trachea and in front of the œsophagus, the first being a direct continuation of the main trunk.

The intestinal canal was 34 feet long; and the two cæca, each 2 feet long and arranged like a spirally twisted cone, were situated 11 feet from the pylorus, which is very different from their situation in most birds, as has been noticed by Owen.

The diaphragm was well marked. It formed a partition which divided the thoracic cavity into two parts, one posterior and small containing the lungs, and the other anterior and large containing the heart and liver. It was a fibrous membrane, concave forwards, with a muscular attachment at either side to the ribs and intercostal tissues, which it joined in about the middle of their course. This muscular part was formed of transverse fibres in the middle and upper part of the chest, while the lower ones slanted slightly upwards as they coursed towards the median line. They were about 2 inches long, and formed a thin layer. The pleural cavity was closed above and below by the fibrous diaphragm becoming blended with the first and last ribs.

The anterior thoracic cavity, which contained the pericardium-coated heart in its upper part, entirely independent of the pleural cavity, was divided into two by a dense fibrous membrane which sprang from two vertebral crura, much as the human diaphragm, and extended above the line to join the sternum, along the border which articulated with the ribs, leaving the heart entirely in front of it; its concavity was directed downwards and forwards; and it was separated from the diaphragm proper by very large air-cells. The œsophagus also ran in the interval; but the aorta was included in the pleural cavity, being clearly seen through the membrane of the diaphragm, along the median line, before its removal.

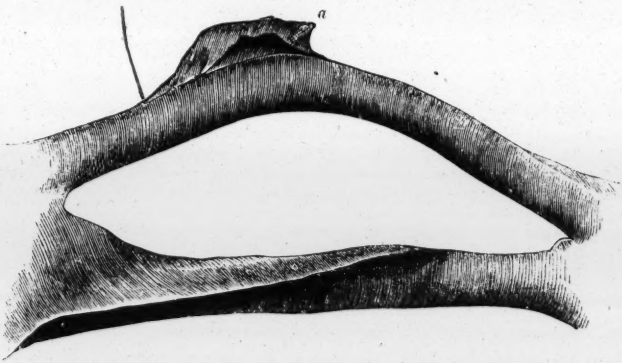
The liver was completely separated from the abdominal cavity by a fibrous membrane, so that when the included viscera had been removed it was not at all brought into view. The mesentery was very dense and strong, the vessels, especially the veins, being of large size.

* The presence of two carotids in this bird, while there is only one in *Rhea*, would require that they should be far separated in Nitzsch's classification of birds according to the number of these vessels—the Ostrich being in his first class, with a carotid from each main aortic branch, and the *Rhea* in the fourth class, with only the left developed. See Nitzsch's 'Pterylography' (English edition), App. p. 171.

Some further points in the anatomy of this bird are not without interest.

There are three parietal abdominal muscles as usual, the muscular fibres of the external and internal being nearly parallel and transverse, while those of the intermediate one are longitudinal. They each send down a dense fascial attachment to the pubic bone; and a semilunar free margin between the ilium and the superior pubic crest appears closely allied to Poupart's ligament, the anterior crural vessels and nerves going underneath it to enter the leg. It may be here mentioned that the main vein of the thigh is the internal saphenous; but the main artery is the one that goes through the sciatic notch, therefore the sciatic. These come into relation with one another in the loop for the biceps tendon at the knee.

Exactly in the middle of the anterior border of the pubic portion of the innominate bone there is a small thin plate of osseous tissue which is connected with the pubis by strong fibrous bands, and which is continued anteriorly and superiorly by cartilage for some distance, when it becomes continuous with the tendons of the parietal abdominal muscles, being most connected with the external oblique.



Portions of the external surface of the left pubis and ischium of the Ostrich. The small osseous plate (*a*) attached to the pubis is represented partly surrounded by cartilage.

In dry skeletons a slight thickening of the anterior border of the pubic bone indicates the attachment of this ossification in most; but in one of the three skeletons in the British Museum this bone is anchylosed on one side, and Mr. Gerrard has specimens in which both are still attached. A diagram of the Ostrich's pelvis in Mr. Haughton's paper also shows this bone anchylosed, though no mention is made of it in his paper.

It would be extremely interesting to make out the homology of this small but perfectly independent ossification. Its relation to the

muscles of the abdominal wall would favour the idea of its corresponding to the marsupial bone of the Kangaroo and its allies; and if that is the case, the whole of the anterior prolongation of the Ostrich's pubis would correspond to the small ridge of bone on either side of the superior margin of the symphysis pubis in the Mammalia.

The *obturator internus* also arises from the superficial surface of this bone and its cartilage, as well as from the adjacent surface of the ischium and from the pubis, extending so far forward that the muscles of the opposite sides are only separated from one another by an inch or so at the symphysis pubis.

Mr. Macalister, in his description of the myology of this bird, has omitted a few of the muscles, some of which from the head will be described, together with those of the leg, which Mr. Frank Darwin has allowed me to introduce in this communication, from his notes and the dissection of that limb in this individual specimen.

Pterygoid.—From the inferior surface of the posterior part of the palate-bone, and from the process of bone which connects it with the main portion of it, this is fibrous—also from the whole of the inferior surface of the pterygoid bone, extending inwards almost to the basisphenoidal rostrum.

The fibres are all directed backwards, and are inserted in two ways:—the outer, and some of those from the palatine longitudinal process, into the anterior surface of the transverse ridge at the angle of the mandible, which posteriorly receives the insertion of the digastric muscle; the inner, and others from the palate-bone, into a fibrous band which runs from the side of the median Eustachian aperture and its cartilaginous continuation to the prominent ridge behind and internal to the condyloid articular surface for the mandible, thus forming an arch under which run the arteries and veins to the head.

This second portion of the muscle acts partly as an opener of the Eustachian aperture, partly as a retractor of the slightly movable pterygoid and palatine bones.

Quadrato-mandibular.—From the whole of the longitudinal ridge which forms the superior internal portion of the quadrate bone, and from the surface of the bone external to it. The fibres are directed outwards and downwards to be inserted into the inner surface of the mandible, in front of the articulation, not extending to the inferior margin, nor forwards further than the optic foramen.

Quadrato-cranial.—From the back of the orbit, below and behind the origin of the recti muscles and the exit of the nerve, from a surface bounded above by a semicircular line, and extending down in the space between the orbit and the quadrate bone. The fibres are directed outwards to the corresponding, internal surface of the quadrate bone, a slight ridge separating the superior ones from those of the quadrato-mandibular.

Gastrocnemius consists of two enormous masses of muscle blending together at their origins round the proximal end of the tibia, and separating lower down into the gastrocnemius anticus, which laps

round the anterior half, and the gastrocnemius posticus, which surrounds the back part of the tibial section of the limb. Gastrocnemius anticus arises partly from the tibia, partly by blending with gastrocnemius posticus; the latter arises from the distal extremity of the femur, the tendon of the quadriceps extensor and patella, and from the tibia. At the tibio-tarsal joint the gastrocnemii form a sheath fitting into the trochlea of the tibia for the passage of the flexor tendons of the toes; this is effected by the tendons becoming very much thickened and semicartilaginous (especially gastrocnemius posticus), and uniting with each other at their edges, the anterior element of the sheath being formed by gastrocnemius anticus, the posterior by gastrocnemius posticus. Just above the joint, gastrocnemius anticus sends off a slip which passes down in a special sheath along the outer surface of the contiguous heads of tibia and tarso-metatarsal bone, and is inserted into the tendon of flexor perforatus. Gastrocnemius anticus is inserted into the posterior surface of the tarso-metatarsal bone just below the tibio-tarsal joint. Gastrocnemius posticus is inserted into the external and internal lips of the posterior border of the tarso-metatarsal bone, forming a sheath for the passage of the flexor tendons; it subsequently forms, with a "sesamoid" cartilage presently to be described, a pulley for the same tendons at the tarso-phalangeal joint, and ends by blending with the fascia covering the sole of the foot. Mr. Macalister* describes the gastrocnemius as ending in one tendon only, which he says forms a sheath for the deeper tendons on the back of the metatarsus.

The flexors of the toes are flexor magnus (perforatus), flexor perforans, flexor externi digiti, flexor interosseus, flexor profundus.

Flexor magnus arises (1) by a tendon from the upper part of the external surface of the outer condyle of the femur, the tendon winding over the knee, and then ending in the muscle; just before it does so, it receives the insertion of the rectus femoris (Cuvier and Meckel), (the pectineus of Owen); (2) from posterior surface of distal end of femur; (3) proximal end of tibia. The muscle ends in a broad tendon, which passes through the gastrocnemial sheath at the tibio-tarsal joint, and is here pierced by the tendon of flexor externi digiti. It passes down the tarso-metatarsal bone in the sheath formed by gastrocnemius posticus, receiving a tendinous slip, already described, from gastrocnemius anticus. At the tarso-phalangeal joint it passes through a sheath formed anteriorly by a "sesamoid" cartilage, posteriorly by the tendon of gastrocnemius posticus. This cartilage is ligamentously attached to the proximal end of the first phalanx of the internal digit, and to the synovial membrane of the tarso-phalangeal joint; it is deeply grooved posteriorly for the flexor tendons, and has two shallow grooves on its anterior surface, which fit on to the condyles of the tarso-metatarsal bone when the digits are extended; there is a smaller "sesamoid" cartilage for the external digit. A small muscle arises from the larger cartilage and by a few

* Alexander Macalister, L.R.C.S.I., Demonstrator of Anatomy, Royal College of Surgeons, "On the Anatomy of the Ostrich (*Struthio camelus*)," Proceedings of the Royal Irish Academy, vol. ix. part 1 (1865).

fibres from the smaller one, and is inserted into the anterior surface of the flexor profundus tendon. The flexor magnus is pierced, as it passes through the sesamoid sheath or pulley, by the tendons of flexor profundus and flexor perforans, and ends by dividing into two slips, which are inserted into the proximal end of the second phalanx of the internal digit.

Mr. Macalister gives as the origin of the flexor magnus the deep pit above the condyles of the femur, the tendon of the rectus femoris, the external lateral ligaments, and the back of the fibula. In the specimen which I dissected, the tendon of the rectus femoris was much smaller than the tendinous head of the flexor profundus, and was inserted into it, which is an arrangement differing very slightly from its usual insertion in birds, which is, I believe, into the fleshy part of flexor magnus (Owen, Anat. Vert. vol. ii. p. 107).

The Rev. S. Haughton* describes the rectus as becoming provided with a second muscular belly (p. 53), which does not at all describe its condition in my specimen. He considers this "digastric rectus femoris muscle" to be "the key to the explanation of the complicated muscular apparatus of the Ostrich's leg" (p. 50). Speaking of it, he says, "it acts before the extensor muscles come into full play; it binds down the two patellæ, braces up the heel-joint, and gives the signal for the m. gastrocnemio-solæus and other associated muscles to contract, and thus produces what may be regarded as one of the most striking phenomena in nature, viz. that the delicate bones and ligaments of a bird's leg, acted on by muscles equal to those influencing a horse's hind leg, shall remain uninjured under the sudden action of forces the slightest error in the application of which would break to pieces the machinery on which they act." This arrangement of the rectus, which Mr. Haughton considers so important, is only a well-developed form of what is found in most birds, and which Prof. Owen says is used in perching, by flexing the toes when the knee is bent (*loc. cit.*).

Mr. Macalister does not mention the muscle from the flexor profundus tendon to the sesamoid cartilage; but says that the flexor magnus sends a slip to it. The function of this muscle must be to keep the pulley-like sesamoid cartilage firmly in its place when the toes are extended preparatory to their flexion in the spring of the bird.

Flexor digiti interni arises from the outside of the tubercle of the tibia, and from the tendon of the quadriceps extensor; the tendon passes through the gastrocnemial sheath and the sesamoid pulley. It pierces the flexor magnus, receiving a tendinous slip from it, and then spreads out and binds the tendon of flexor profundus to the grooved under surface of the second phalanx of the internal digit, and is inserted by two slips into the proximal end of the third phalanx.

Flexor digiti externi arises from the posterior surface of the distal end of the femur, and from the tendinous head of flexor magnus. It passes through the gastrocnemial sheath, pierces the tendon of

* The Rev. S. Haughton, M.D., "Notes on Animal Mechanics.—No. 3. On the Muscular Mechanism of the leg of the Ostrich," Proc. Roy. Acad. Dub. vol. ix. part 1 (1865).

flexor magnus, passes through the lesser sesamoid sheaths, and is inserted into each of the three proximaal phalanges of the external toe.

Flexor profundus arises by two heads—one from the posterior surface of distal end of femur, the other from the posterior surface of the upper half of the tibia and part of the fibula. The tendon of the external muscle passes at the tibio-tarsal joint through a canal in the tendon of gastrocnemius anticus. The inner tendon does not enter the gastrocnemial sheath till below the joint; it passes down the inner surface of the contiguous ends of the tibia and the tarso-metatarsal bone, bound down to them by a special aponeurotic sheath, and joins the outer tendon near the tarso-phalangeal joint. The common tendon passes over the sesamoid pulley, piercing the flexor magnus tendon; it is here much thickened and hardened, and fits into the grooved and thickened tendon of flexor perforans. It is inserted into the fourth phalanx of the internal toe, sending off a short strong slip to the third phalanx, and an elastic slip to the second phalanx, as well as a small but long slip to flex the fifth phalanx of the external digit.

Mr. Macalister describes the tendon of the flexor profundus as being inserted only into the last phalanges of both digits; the insertion, as it was in my specimen, accords, I believe, with the usual condition of this tendon in birds.

The *flexor interosseus* is a delicate and weak muscle, which consists of numerous very short oblique fibres arising from the posterior surface of the tarso-metatarsal bone, and inserted into an aponeurosis stretching the whole length of the muscle; this aponeurosis ends in a tendon which is inserted into the outer surface of the first phalanx of the external digit. Its action appears to be to abduct and flex the toe.

A small muscle which Mr. Macalister does not describe, but merely mentions as probably representing the dorsal interosseus, arises from a small triangular space on the anterior surface of the distal end of the tarso-metatarsal bone, and is inserted into the capsular ligament of the tarso-phalangeal joint. There were some differences between the specimen which I dissected and that described by Mr. Macalister, in the precise origin of some of the muscles, which I have not thought to be worthy of note.

The *extensor communis digitorum* presents no peculiarities; the very small *extensor unguis* mentioned by Mr. Macalister was present.

3. Note on a Collection of small Mammalia made by Mr. Monteiro in Angola. By Dr. W. Peters, F.M.Z.S.

[Received February 13, 1872.]

Mr. Sclater has sent to me for determination a collection of small Mammals made by Mr. J. J. Monteiro, C.M.Z.S., during his last travels in Benguela and Cambembe. The collection contains ex-

amples of eight species, of which, in the interests of science, I think it advisable to record the names and exact localities.

1. *Pterocyon stramineus*, Geoffroy. Benguela.
2. *Epomophorus macrocephalus*, Ogilby. Benguela.
3. *Epomophorus gambianus*, Ogilby. Benguela.
4. *Phyllorhina commersonii*, Geoffroy. Benguela.
5. *Nyctinomus limbatus*, Ptrs. Benguela.
6. *Mus barbarus*, Linné. Cambembe.
7. *Mus musculus*, Linné. Cambembe.
8. *Georychus hottentottus*, Lesson. Cambembe.

4. Synopsis of the *Lamellirostres* of the Argentine Republic. By Dr. Hermann Burmeister, F.M.Z.S.

[Received January 22, 1872.]

The tribe of natatorial birds named *Lamellirostres*, from the peculiar structure of the sides of the bill, which are furnished at the edges with small perpendicular corneous lamellæ, is very numerously represented in the vast territory of the Argentine Republic. As the list of species named in my travels through that country (vol. ii. p. 512 *et seq.*) is not entirely complete, and as I am now, after a residence of ten years in Buenos Ayres, better acquainted with the geographical distribution of many of the species than at the time of my first publication, I have thought it would be useful to prepare a second synopsis, giving additional remarks on most of the species, and correcting some of my former views from new observations.

I. Phœnicopterinæ.

1. Phœnicopterus.

1. Phœnicopterus ignipalliatus, Is. Geoff. Mag. de Zool. 1832, *Aves*, pl. 2; Burm. Reise, ii. p. 512.

This Flamingo is common on the lagunes in the southern parts of the pampas of the Republic. I have obtained it at Mendoza and at Buenos Ayres. As I have already stated in my 'Reise,' the colour of the base of the bill is not rose-colour but white, and the legs of young birds are yellowish, with bluish-red articulations, but greenish grey in the old birds, with darker reddish articulations and toes.

2. Phœnicopterus andinus, Philippi, Reise durch die Wüste Atacama, p. 164, pls. 4 & 5.

This well-marked species is found also in the north-western extremity of the Republic, on the lagunes in the eastern valleys between the Cordilleras and the adjacent mountains, and has been observed there by one of my countrymen, Hr. Schickendantz.

II. Anatinæ.

2. Cygnus.

3. Cygnus nigricollis, auct.; Burm. Reise, ii. p. 512.

A common bird in the southern parts of the Republic near the river Paraná and the great lagunes of the interior. It is often brought into the market at Buenos Ayres, and is occasionally to be seen in flocks consisting of from four to five individuals, flying at a great height over the town towards the river.

4. Cygnus coscoroba, Gray; Burm. Reise, ii. p. 512.

This bird is more numerous than the preceding species, and is generally seen in large flocks near Santa Fé on the river Salado, and in the south of Buenos Ayres on the same river. It is very common in Patagonia on the rivers Colorado and Negro, and is also to be seen in Buenos Ayres, flying high over the town in flocks which I have never observed to exceed six individuals in number. On the shore these flocks generally unite and form large bodies.

3. Sarcidiornis.

5. Sarcidiornis regia, Eyton; Burm. Reise, ii. p. 513.

This large and beautiful Duck I have found only in the northern province of Tucuman, and never in the southern parts of the Republic near Paraná or Buenos Ayres. Azara says the same, and that the bird is common in Paraguay.

4. Bernicla.

6. Bernicla melanoptera, Gay; Philippi, Wiegm. Arch. 1863, i. p. 185.

Chloëphaga melanoptera, Eyt. Monogr. p. 93; Burm. Reise, ii. p. 513.

This bird is found in the valleys of the Cordilleras from 8000 to 10,000 feet above the level of the sea, not descending into the plains. It is nowhere common, at least in the southern districts of the Republic.

I only found this bird while on my way from Copacavana to Copiapo on the river Blanco. They were always in pairs; the sexes are alike in colour. The name given to this well-known bird by the inhabitants is "Pinquen."

There are three other species of *Bernicla* in the Argentine Republic, all living in the most southern parts of that country, from Bahia Blanca to the Straits of Magellan, where I have never been. On the approach of winter two of these species remove nearer to Buenos Ayres, where they are found in the vicinity of Tondil and the Laguna de los Padres, but exceptionally. They are more common at Bahia Blanca and El Carmen, on the Rio Negro, from which locality I have lately received both species. The third is an

entirely antarctic bird, as its name imports; and its range extends from Terra del Fuego to the inlet of Santa Cruz, where, I have been informed by a friend, this bird is found every year.

My distinguished countryman, Prof. R. A. Philippi, of Santiago in Chile, has published (in conjunction with L. Landbeck) in Wiegmann's 'Archiv' (1863, i. p. 187 *et seq.*) a valuable synopsis of the Chilian species of *Bernicla*, to which I refer for further information.

7. Bernicla antarctica, Gmel.; Burm. Reise, ii. p. 514; Phil. Wiegm. Arch. 1863, i. p. 199.

This species is never seen in the northern districts of Patagonia, but only in the south near the Straits of Magellan, going in the winter to the inlet of Santa Cruz. My former notice (in my Journey) that *B. antarctica* is found on the Sierra Tinta is an error caused by my having taken the following species (which was known to me at that time only by the description of my son) for *B. antarctica*.

8. Bernicla dispar, Philippi, Wiegm. Arch. 1863, i. p. 190. 2.

Bernicla magellanica, Cassin, Gilliss' Exped. ii. p. 201, pl. 24.

To this species must be referred my notice of a Goose living in the south of Buenos Ayres on the Sierra Tinta, near Tandil, and the adjacent country. The full description of Professors Philippi and Landbeck renders it unnecessary for me to add any thing further. I can only now extend the habitat of the species more to the south, having received both sexes from El Carmen on the river Negro, where this Goose is common in the summer, proceeding to the northern districts in the winter.

9. Bernicla poliocephala, Gray.

Bernicla inornata, Des Murs, in Gay, Faun. Chil. i. p. 444.

Bernicla chiloënsis, Phil. & Landb. Wiegm. Archiv, 1863, i. p. 195.

This beautiful Goose, the smallest of the species of our country, was described by Des Murs as the female of the *Anser inornatus* of King, which is, according to the very probable opinion of Philippi and Landbeck, the young of *Bernicla magellanica*. Therefore they describe the species under the new name of *Bernicla chiloënsis*. But this name is by no means suitable, because the bird lives also on the continent, and its range extends over the whole of Patagonia, where it is one of the most common Geese. Both sexes are nearly alike in colour and form, but the colours of the males are more brilliant, and the females have numerous black semicircles on the reddish brown colour of the neck, breast, and commencement of the back. The full description of this bird given in Wiegmann's 'Archiv' renders unnecessary any further remarks from me. I received the bird from El Carmen, Bahia Blanca, in the vicinity of Dolores, where it is not uncommon in the winter.

5. Cairina.

10. Cairina moschata auct.; Burm. Reise, ii. p. 514.

This large Duck I have seen only in the eastern and north-eastern parts of the country, near the river Paraná, and occasionally from Santa Fé and Tucuman; but I have never observed it in the market at Buenos Ayres.

6. Dendrocygna.

11. Dendrocygna fulva auct.; Burm. Reise, ii. p. 514.

12. Dendrocygna viduata auct.; Burm. *l. c.* p. 515.

The range of both these birds extends from Buenos Ayres to Tucuman; and they are nowhere rare. They are often brought to the market of Buenos Ayres, where I have frequently purchased specimens of them.

The second species is generally seen in the evening; and during the night its presence may be known by its peculiar cry while flying over the town in flocks, bird answering to bird, as has been already observed by Azara. This species is very common in Paraguay.

7. Dafila.

13. Dafila bahamensis (Linn.); Burm. Reise, ii. p. 515.

In the same parts of this country, but not in the west. Often brought to the market in Buenos Ayres.

14. Dafila spinicauda (Vieill.); Burm. Reise, ii. p. 515; Sclater, Proc. Zool. Soc. 1870, p. 666, pl. 38.

This Duck is found in all the southern provinces from Buenos Ayres to Mendoza, and is nowhere rare. As the eastern and western specimens are somewhat different in colour, I thought of separating the species into two, giving to the western form the name of *oxyura*, after Meyen (*cf.* Reise, ii. p. 515); but as I have not any western individuals for examination, I will accept the opinion of Messrs. Sclater and Salvin (Proc. Zool. Soc. 1869, p. 157) that these two may be the same. The specimens from Buenos Ayres are somewhat more brilliant in colour, the edges of the tectrices and secondary remiges being yellow, and not white. This Duck was first described by Azara, who obtained specimens at Buenos Ayres (Apunt. iii. p. 421), and then by Meyen, who brought it from Chili, where the bird is very common.

8. Querquedula.

14. Querquedula flavirostris (Vieill.); Burm. Reise, ii. p. 516.

15. Querquedula maculirostris (Licht.); Burm. ibid.

16. Querquedula torquata (Vieill.); Azara, Apunt. iii. p. 452 (male); ibid. no. 352, "*Anas leucophrys*, Vieill." (female).

This beautiful Duck is rare, and was brought to me by a friend

some years ago, in both sexes, from the river Paraná, near Las Conchas, where the bird lives on the numerous branches of the river between the flat islands of its delta. I have never seen specimens in the market of Buenos Ayres, where the two former species of *Querquedula* are very common, and sold every day during winter (from May to September). Azara has described the sexes of *Q. torquata* under different names.

17. Querquedula brasiliensis (Briss.); Burm. Reise, ii. p. 517.

Ipecutiri, Azara, Apunt. iii. p. 445.

Also a very common bird in the interior and northern provinces. Very numerous near Paraná, Santa Fé, and Tucuman, and likewise in Paraguay and the Brazils, where this Duck is the most common of all species. Rare in the vicinity of Buenos Ayres, and very seldom brought into the market.

9. Pterocyanea.

18. Pterocyanea cyanoptera (Vieill.); Burm. Reise, ii. p. 514.

Common in all the southern provinces from Buenos Ayres to Mendoza; rarer in the north to Paraná and Santa Fé.

10. Spatula.

19. Spatula platalea (Vieill.); Burm. *l. c.* p. 517.

Only in the eastern districts of the Republic, from Buenos Ayres on the river to Paraguay, and not rare.

11. Mareca.

20. Mareca chiloënsis, King; Burm. Reise, ii. p. 517.

On both sides of the Cordilleras, and likewise common on the plains of Patagonia and up to Buenos Ayres, where this Duck may be found every day in the market during the winter. Not abundant in the northern parts of the country, and never seen on the river near Paraná.

12. Metopiana.

21. Metopiana peposaca (Vieill.); Burm. Reise, ii. p. 518; Sclater, Proc. Zool. Soc. 1870, p. 666, pl. 37.

Likewise on both sides of the Cordilleras, and common throughout the whole of Patagonia to Buenos Ayres and Paraná, where I have observed this Duck in large flocks on the lagunes near the river.

13. Erismatura.

22. Erismatura ferruginea, Eyton; Gay, Fauna Chilena, i. p. 458.

Anas cyanorhyncha, Licht. MS.

This peculiar Duck is also found on both sides of the Cordilleras, and may be seen occasionally in the vicinity of Buenos Ayres, where it has been sometimes killed by my hunter on the Laguna Matanza at the south of the town. As the description given in Gay's work is very short and only applicable to the summer dress, I think it desirable to give a full description of this bird.

The old male in the summer dress is of a dark reddish-brown colour on the back, and somewhat paler, mixed with grey, on the underside. The head and neck are black, or dark blackish grey, mixed in the younger plumage with reddish margins to the feathers. The wings are dark blackish brown with reddish spots; and the tail is clear yellowish grey; the bill is blue-grey; and the legs are black, the iris dark red.

The bill, somewhat shorter than the skull, is very high at the base, and the plumes on the front are somewhat produced; the flat apical half is nearly of the same breadth, and the hook on the tip very small. The small nostrils are placed in the middle, where the flat apical half begins. The much narrower under mandible is whitish, the upper mandible bluish grey, the hook reddish brown.

The plumage is of a silky appearance, very soft and very compact; all the feathers are broad and rounded, and those on the back very large. The wings are short, and do not reach the tail; and the first of the pointed remiges is the longest. The most peculiar organ is the tail, which consists of eighteen small very rigid feathers, successively longer from the outer to the middle, the first on each side being shorter than the half of the middle. This strong rigid tail is therefore cuneated, and passes directly out of the plumage without any tail-coverts, as is the case with many other Ducks, the plumage being transversly cut off at the commencement of the tail on the upper and under parts. The feet are large; and the outer toe is twice as long as the tarsus, which is much compressed; the hinder toe is small and furnished with a small membrane; the whole foot is black.

My specimens measure 14 inches long; the bill $1\frac{1}{2}$ inch, the closed wings (which have a small tubercle on the hand-joint) 5 inches, the tail 3 inches, the tarsus $1\frac{1}{4}$ inch, and the outer phalanx $2\frac{1}{2}$ inches.

The young male and the female are of entirely different colours, but have the same style of plumage. The whole of the upperside of the body is a blackish brown, each feather having a thin yellowish grey or whitish margin, which gives to the back an undulating appearance. The underside is whitish grey, or yellowish grey, with faint blackish-grey undulations, as every feather is dark grey, but with a large white or yellowish edging, which covers the whole of the grey part so that only here and there the grey ground is to be seen.

The wings and tail are blackish grey, the latter being somewhat yellowish. A small whitish or yellowish stripe commences at the sides of the bill, and passes under the eye to the neck, terminating over the ear. This white stripe is lighter in the female; the whole of the throat and sides of the neck are of the same colour, so that

the plumage on the fore side of the neck forms a darker ring under the white throat, between it and the whitish breast.

All this whitish colour is more yellowish in the winter dress of the males, and nearly of a reddish colour on the breast.

This bird is very ready to dive, and disappears under water immediately on observing the sportsman, not coming again to the surface until some distance off. Owing to the shortness of its wings its power of flight is very limited; so it adopts the expedient of diving in order to escape its foes.

All the before-mentioned species of *Anatidæ* are represented in the Public Museum of Buenos Ayres.

Azara describes two other species, which I have seen, but which have not yet reached my hands.

These are:—

23. ANAS BICOLOR, Vieill.; Azara, Apunt. iii. p. 443. no. 436.

Anas collaris, Merrem, Ersch. & Gruber, Encycl. tom. xxxv. p. 25.

This beautiful Duck I occasionally saw on the lagunes near my quinta, when I lived at Paraná in the year 1859; but I never had my gun, and so could not obtain it. It is not common, and lives in society with the other species there.

24. ANAS MELANOCEPHALA, Vieill.; Azara, Apunt. iii. p. 447. no. 438.

Anas atricapilla, Merrem, *ibid.* p. 26; Gill, U. S. N. Astr. Exp. ii. p. 202, pl. 25.

Of this Duck I have only seen one specimen, which was in the possession of a private collector, who killed it on a lagune in the interior; it seems to be very rare in our province. The Prince Max. of Wied mentions it as having been obtained from Rio Grande do Sul in Brazil.

I will close this paper with some remarks on the number of the tail-feathers of the Ducks, which varies in different species. Possessing a large number of specimens of *Erismatura*, I was induced to give this genus a careful examination.

Erismatura ferruginea has eighteen rigid feathers, the largest number observed by myself in this group of birds; and a like number was found by Azara in *Cairina moschata*.

The long-tailed group of *Dafila* (*D. bahamensis* and *D. spinicauda*) have sixteen tail-feathers, and Azara mentions that he found the same number in *Anas bicolor*, as also in *Spatula platalea*.

In *Sarcidiornis regia*, *Metopiana peposaca*, *Mareca chiloënsis*, *Dafila viduata*, *D. fulva*, *Querquedula brasiliensis*, and *Q. maculirostris* I have found fourteen tail-feathers.

Most of the smaller species have twelve tail-feathers: such are *Pterocyanea cyanoptera* and the other *Querquedulæ*. Azara also gives the same number for *Anas melanocephala*.

5. On some Persian, Himalayan, and other Reptiles. By J. Anderson, M.D.

[Received January 15, 1872.]

Cyclemys oldhami, Gray.

I have received a living specimen of this species and a perfect shell from Samagooting in the Naga Hills in Assam, to the east of the Brahmaputra. The first measures 8½ inches in length, and the second is 9 inches long.

In both specimens the pectoro-abdominal sternal suture is unanchylosed, conferring, in the living example, distinct mobility on the lobes of the sternum, but of a more limited character than in *Cuora*. In the dried shell the mobility between the pectoral and abdominal plates is at once demonstrated when the sternum is moistened in water, while before doing so there is but little evident motion.

In the living specimen the portion of the abdominal plates overlapping the line of the pectoro-abdominal joint has become more or less fractured, so to speak, evidently by the motion of the two halves of the sternum on each other; and in the other specimen (the shell) the fracturing is complete, and the suture or joint is carried through the plates from side to side. Anterior to the outer third of the suture on each side is the separated portion of the abdominal plates, broken up in an area, which Theobald has compared to a curious fossa. Behind the middle third of the joint is a separated piece of each pectoral. The more perfectly fractured character of the portions of the abdominal plates that overlap the suture in the larger, as compared with their imperfect fracturing in the smaller specimen, would seem to favour Theobald's observation that the suture of the lobes of the sternum becomes more developed with age. If Dr. Gray *, who combats this observation of Theobald's on the ground that it is opposed to the experience of most zoologists and the specimens in museums, had been familiar with the animal in life, or had examined the moistened sternum of a museum specimen, it is questionable whether he would have committed himself to dispute the correctness of the observations of a zoologist who spoke from personal knowledge of the living animal, and who did not confine himself to a crude knowledge gained from museum specimens. In connexion with Theobald's observation it is curious to remark that Dr. Gray did not observe any mark of the transverse suture on the sternum in a specimen which he doubtfully regarded as a younger stage of *C. ovata*, as compared with another example of the same species, which he regarded as more aged than the former, on which the cross suture of the sternum was much eroded on the edge, doubtless in the same way as I have described in the present species; so that Dr. Gray's own facts substantiate Theobald's conclusion which he disputes.

* Suppl. Cat. Shield Rept. B. M. 1870, p. 23.

The colour of the body of this species is pale yellowish, the limbs, tail, head, and neck being brownish, with a tinge of olive, the head being unspotted.

CUORA AMBOINENSIS, Daud.

I have received a male of this species from Samagooting in the Naga Hills, Assam, measuring 7″ 8‴ in length.

VARANIDÆ.

HYDROSAURUS SALVATOR, Linn.

This fine Lizard is not uncommon in Assam.

LACERTIDÆ.

LACERTA STRIGATA, Eichw.

Scales oblong, granular, placed obliquely but keeled longitudinally. Ventral plates in six rows, the two central lines of scales each about half the size of the one external to it. Small scales along the external margin of the outer row, which has twenty-five scales from the axilla to the groin. Preanal plate large, semicircular, its hinder margin slightly convex; surrounded by two rows of small scales and a rudimentary third. Nineteen to twenty-two femoral pores. Verticils of tail regular, of moderate length and breadth, strongly keeled. Nostril in the lower hinder angle of the nasal, with the suture of the rostral and first labial touching the middle of its lower margin; two small shields behind it of nearly equal size, the lowest one triangular, with its apex directed downwards and backwards, the shield above it pentagonal. Frontal of moderate size, hexagonal. Postfrontals each about the same size as the frontal, heptagonal, forming a moderately broad suture with each other, but a very narrow one with the anterior loreal and parietal. Vertical broader anteriorly than posteriorly, rounded in front, obscurely pointed; lateral margins concave; posterior margins oblique, straight, or slightly concave. Parietals larger than the postfrontals, triangular, with the lateral margins convex. Postparietals smaller than parietals, pentagonal, forming a very small suture with the vertical, and one of nearly equal breadth with the parietals and preoccipitals. One or two small shields behind the postparietals, one before the other. Preoccipitals as large as the postfrontals, pentagonal, forming a broad suture with each other, the postparietals and exoccipitals and sutures of nearly equal width with the vertical and occipital, which are partially wedged in between them. Occipital rather smaller than the parietal, its anterior margins meeting at an obtuse angle, lateral margins convergent, posterior end truncated. A small truncated conical postoccipital. Exoccipitals larger than any of the other head-plates, hexagonal, external posterior angle rounded. Two temporals equalling the length of the exoccipitals, and forming a suture with them externally, the foremost one being longest and largest. An elongated supraaural placed obliquely

across the ear below the hindermost temporal. An area of moderately large and small scales between the temporals and upper labials. Two loreals, the posterior one the larger. Seven upper labials, the one below the eye much larger than the others. Seven lower labials. Ear vertically oval. Four pairs of large shields behind the mental, increasing in size from before backwards, the posterior pair about four times the size of the anterior one. The fold, from ear to ear, not prominent. The anterior margin of the neck-fold with ten large scales from side to side.

Dark greenish olive-brown above, with five fine bluish-green narrow longitudinal lines from the head to the base of the tail—one from the ear along the side, another from above the ear over the former, and the third from the postoccipital along the middle of the back: the area between these spotted with blackish. Under surface rich green, yellowish about the anal region.

Snout to vent $2\frac{4}{12}''$; vent to top of tail $4\frac{9}{12}''$; anterior extremity $\frac{9}{12}''$, posterior extremity $1\frac{4}{12}''$; fourth toe $\frac{11}{24}''$; snout to postoccipital (hinder margin) $\frac{13}{24}''$.

Hab. Shiraz, Persia. Two specimens.

Duméril and Bibron regard this species as a variety of *L. viridis*; and in this they are followed by Prof. Filippi, who records it from Tiflis and Senkoran.

Eremias cæruleo-ocellata, D. & Bib. Erpét. Générale, vol. v. pp. 295, 296.

Head much pointed; tail not enlarged at the base, long and slender. Frontal obliquely quadrangular, with an angle in the middle line before and behind, entire or longitudinally divided in two, in contact with two of the nasals, anterior loreal, and the postfrontals. Postfrontals hexagonal, forming a small suture together. Vertical hastate, lateral margins concave, convergent. Preoccipitals triangular, with the small wedge-like occipital indenting their line of union posteriorly. Exoccipitals large, subquadrangular, narrower before than behind. A line of six small linear granuloid scales along their external margin. Temporal region granular. Two large supraciliaries, together forming an oval surface. Two or four small scales before them, with two rows of small granules along their external border. Anterior loreal small, quadrangular; posterior large, subquadrangular. Five linear scales along the ridge of the eye, the anterior one very much longer than the others. Two small scales above and behind the posterior angle of the eye. Ten to eleven upper labials, exclusive of the inferior orbital plate, which has two small rounded scales behind it; seven to eight lower labials; five pairs of large plates below them, the first and last pairs the smallest. A fold across the throat from ear to ear. The prevertical fold with three rather large scales in its middle. Dorsal scales minute, smooth, ovally rhomboidal, arranged more or less in transverse rows, with a minute granule between each scale posteriorly. Scales of tail oblong, arranged in verticils. Scales on front of thighs and under surface of tibial portion of leg very large, hexagonal. Either

two moderately-sized preanal plates surrounded by smaller ones, or all the plates of one size and not enlarged. Femoral pores thirteen or fourteen. Ventrals square, smooth, arranged in transverse rows of fourteen to eighteen scales.

Yellowish olive-brown above, with a series of yellowish or bluish spots, with black margins along each side of the body, spotted with black on the sides of the head, neck, and body, and on the dorsal surface. Under surface yellowish white. Tail uniform dark olive-green above and below in its two posterior thirds.

Tip of snout to vent $2\frac{4}{12}''$; vent to tip of tail $3\frac{6}{12}''$; snout to occiput $\frac{7}{12}''$; anterior limb $\frac{10}{12}''$; posterior limb $1\frac{1}{12}''$; fourth toe from base of fifth $\frac{7}{12}''$.

Hab. Yarkand.

I have followed Duméril and Bibron in regarding this as distinct from Pallas's *Lacerta velox* and Eichwald's *L. argulus*, for the reasons stated by the former authors. The specimens before me, although they were obtained in Yarkand, agree in every particular with the description of the types which came from the Crimea. Filippi records *E. variabilis*, Fitz., as a common species throughout Persia.

OPHIOPS ELEGANS, Ménétriés.

Frontal quadrangular, its anterior margins slightly convex or straight, meeting at an obtuse angle with the two upper shields of the rostral, which separate it from the rostral. Postfrontals either transversely triangular, with the base directed outwards, or more or less pentagonal; in the former case they may or may not form a suture behind the rostral, while in the latter instance they invariably meet in the middle line, and the suture is usually broad. Vertical moderately elongate, rounded and rather pointed anteriorly, its margins meeting at an obtuse angle; lateral margins concave, convergent; posterior extremity either slightly pointed or transversely truncated. Preoccipitals small, pentagonal, forming a broad suture together with a small lozenge-shaped occipital behind them, with a tumid disk in its centre. A small triangular postoccipital. Two large pentagonal exoccipitals with two linear temporals along the outer margins, the posterior one the smallest; temporal region below them granular. Three supraciliaries, the anterior one very small, two posterior ones very large, together forming an oval, with a flattened external margin, along which there is a longitudinal row of fine granules. Two or three small almost granular plates behind the posterior one. Two loreals, one before the other, and contributing to form the "canthus rostralis;" the anterior one small. Eight upper labials, the fifth forming the lower support to the eye, with three small labials behind it; one small shield above the last, separating it from the supraaural plate, which is either oval or oblong. Eight lower labials with six large shields below, three on each side, the fourth pair from the mental the largest. The throat in some (twelve) specimens shows a distinct fold from ear to ear, while it cannot be detected in others. Scales from occiput to

nearly in a line with the axilla almost granular and small-keeled. Those on the remainder of the body rhomboidal, strongly keeled, imbricate, with their tips directed backwards and upwards. The scales on the middle line of the back larger than the others, and the scales generally on the lumbar and mesial regions larger than any of the rest, and very strongly keeled. Scales on tail arranged in verticils, very strongly keeled above; those on the anterior fifth of the under surface smooth, on the remaining four fifths keeled. Eight rows of ventral scales, with a lateral line of small scales intermediate between them and the dorsal scales. The two rows in the middle of the belly are smaller than the row on either side of them. A large transversely elongated preanal shield, with a smaller one before it, surrounded by some still smaller shields.

Colour olive, brownish- or even reddish-bronze above, with two whitish longitudinal lines along each side, the lower one proceeding from the snout along the lower margin of the eye over the shoulder to the groin; the other and higher, through the "canthus rostralis," over the eye and along the side of the back. Below the former, the sides of mouth (labials), neck, and sides of body are spotted with blackish. The area between these two white lines is either reddish brown, or reddish and black-spotted; and there is a band of black spots along their upper margins. A short narrow dark-brown line from the occiput on to the neck. A few black spots on the side of base of tail. Limbs dark brown or black-spotted above, most markedly on the hinder limbs. Under surface yellowish.

Snout to vent 2″; vent to tip of tail $3\frac{9}{12}$″; snout to occiput $\frac{11}{12}$″; anterior extremity $\frac{8}{24}$″; posterior limb $1\frac{3}{12}$″; fourth toe from base of fifth $\frac{7}{12}$″.

Hab. Shiraz, Persia.

This species is evidently very variable, both in colouring and in some of the details, chiefly affecting its posterior frontals, which are sometimes quite separate from each other, while in other examples they are contiguous, and form a broad suture. The specimen figured by Duméril and Bibron shows the latter peculiarity. It is evidently, from its peculiar coloration, a form inhabiting a dry country; and it is probably an inhabitant of arid hill-sides, where its colour will hardly be distinguishable from the soil. Ménétriés's specimens were from Bahon; it has also been obtained at Smyrna, and Eichwald includes it in his fauna.

Four species of this genus have been recognized in India:—*O. jerdoni*, Blyth; *O. theobaldi*, Jerdon; *O. beddomii*, Jerdon; *O. microlepis*, Blanford.

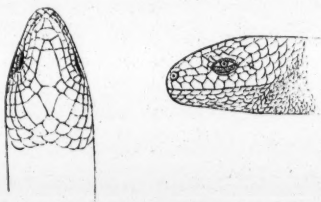
EUMECES LADACENSIS, Gthr. Rept. of Brit. Ind. p. 88.

This species has a transparent eyelid, no supranasals, four supraciliary shields, thirty-eight rows of scales round the body, and fifty-six to fifty-eight transverse series between the fore and hind limbs. The opening of the ear is denticulated, and the subcaudals are broad, and there are two enlarged preanal scales. Günther states that

the fore limb, when laid forward, reaches to the snout; but in the specimen before me it reaches only to the anterior angle of the eye. The tail of my individual is forked at its middle, the two prongs being of nearly equal length, the longest measuring $1\frac{5}{12}''$, and the undivided portion of the tail $\frac{9}{12}''$, total length of the organ being $2\frac{1}{12}''$. The body is $1\frac{11}{12}''$ long, the head $\frac{5}{12}'''$, the fore limb $\frac{8}{12}''$, and the posterior limb $\frac{10}{12}''$ in length.

Hab. Ladak.

Fig. 1.



Anguis orientalis.

ANGUIS ORIENTALIS, n. sp. (Fig. 1.)

Rostral triangular. Two supranasals on each side enclosing an azygos quadrangular shield in contact with the rostral in front, and the internasal and postfrontals behind. Internasal triangular, pointed in front, with the fronto-nasals on each side of it. Fronto-nasal pentagonal or elongately oval and pointed at each end, lying between the posterior supranasal, internasal, and frontal, in contact behind with two shields, one of the side of the head, and one of a longitudinal line of eight small shields between the supraciliaries and the eye. Frontal rather large, triangular, broadly truncated in front, with a wavy posterior margin. Three postfrontals in a transverse row, more or less quadrangular. Six rather large supraciliaries; two small scales behind the eye. Vertical very large, broader in front than behind, lateral margins divergent, and then passing inwards at an obtuse angle to the posterior margin, which is transversely truncated. Two pairs of quadrangular parietals behind the supraciliaries, the external shield the largest, the inner one touching by its internal margins the vertical and parietal. The latter is a long wedge-like pentagonal shield truncated anteriorly, but with its lateral margins convergent to a point behind. A pair of large oblong obliquely placed exoccipitals, with a triangular posteriorly pointed small shield between their posterior margins. Two rows of temporals, three on either side, but each external to the parietals and exoccipitals. A single row of small shields from the fourth lower labial round anteriorly to the corresponding labial of the opposite side. Two rows of small shields from and below the fourth to the last lower labial. A large azygos chin-shield behind the infralabial line of scales, with four large pairs posterior to it,

the shields of the first pair forming a broad suture, the others separated by a number of small scales. Thirty rows of scales around the body, one inch behind the head. Two longitudinal rows of hexagonal scales, with their long diameter set nearly transversely to the body; the rows immediately external to them and on the sides slightly smaller and rhomboidal, and distributed in oblique rows. Ventral scales hexagonal, larger than those on the vertebral line. Vent with four pairs of anal plates, the central pair the largest. The tail contracts rather suddenly a little beyond its middle; and the remaining portion is slight, turned up, and covered above and on its sides with large brown scales. Scales on under surface of tail larger than on ventral surface of body, with rounded rather pointed margins.

Brown above, a dark brown band along the vertebral line of scales, and another one of the same hue along the fourth line of scales external to the former, the four longitudinal lines below shaded with dark brown, which fades away on the sides. General hue of under surface and lower half of sides olive-yellowish. The scales of the side and under surface have each a dark brown centre, with a broad brownish-yellowish or greenish-yellowish margin; and the predominance of the two last-mentioned colours on the sides and under surface determines the general tints of these parts, the dark centres, however, of the scales being quite distinct.

Length: snout to vent $4\frac{9}{12}''$, vent to tip of $\frac{9}{12}''$, snout to occiput $\frac{9}{12}''$.

Hab. Rehst, on the Caspian Sea.

This species is distinguished from the *A. fragilis*, Linn., by the greater number of shields on its head and scales round its body.

Sepidæ.

Gongylus ocellatus, Wagler.

Head much pointed; rostral rounded in front, concave posteriorly. Two supranasals, separated by a minute prefrontal. Postnasal pentagonal, in contact with the first and second labials. Two large loreals, the anterior one about thrice as large as the posterior shield, behind which there are three scale-like preoculars, one behind the smallest loreal, and two in a line above it. Frontal large and broad, in contact with the prefrontal, supranasal, vertical, anterior loreal, and anterior supraocular, which rests on the two uppermost preoculars. Vertical large and elongate, exceeding the distance between its anterior extremity and the tip of the rostral. A small azygos shield wedged into its posterior extremity. One pair of occipitals about the same size as the vertical. Mental not quite so large as the shield behind it. Eyelid with a longitudinally elongate transparent disk. Ear round, of moderate size, not denticulated. Scales in thirty-two rows round the body.

Upper surface (in spirits) of body and tail brown, every alternate line of scales marked by a transverse black band, with a longitudinally elongated bluish-white spot in the centre of each scale.

The bands are lost on the head, where their place is taken by black spots with whitish centres. Some of the bands run into each other, so that the transverse arrangement is not perfect. Labials with black margins, and sides of neck and body black, reticulately spotted on a yellow ground.

Under surface immaculate.

Hab. Bushire, Persia.

This Lizard has been figured no less than three times—first by its discoverer, Olivier, afterwards by Geoffroy, and lastly by Gervais in the 'Dictionnaire Universelle d'Histoire Naturelle;' and it is doubtful whether Geoffroy's figure excels the first, which certainly the last-mentioned does not.

Geckotidæ.

Hemidactylus persicus, n. sp. (Fig. 2.)

Back covered with numerous white, rather large, trihedral tubercles, with blackish-brown ones intermixed; nearly all the tubercles about half the size of the opening of the ear, which is longitudinally crescentic, the concavity being directed forwards. There are no tu-

Fig. 2.



Hemidactylus persicus.

bercles on the side of the neck; and those on the nape are less than half the size of those on the loins, where they have a tendency, as in the body generally, to be arranged in longitudinal rows, fourteen such lines occurring before the loins; all the tubercles are minutely striated in a radiate manner from their heads. A patch of large rounded granules between the nostril and eye, and another behind the nostril. The ventral scales are small, and forty-five to fifty rows

occur in the middle of the belly; those on the throat are very minute. Ten upper, and eight lower labials. A pair of large chin-shields behind the azygos lower labial, and forming a pretty broad suture behind the latter, succeeded by another pair, the shields of which are widely apart, their anterior extremities only touching the first pair of labials. Two or three lines of largish scales below the remaining lower labials. Tail with regular transverse rows on its upper surface of rather pointed trihedral tubercles, seven in each row. A small preanal region of enlarged scales in the female.

Colour pale yellowish brown, with six faint brownish transverse narrow dorsal bands, the tubercles in these areas being almost black; a darkish brown streak from the nostrils through the eye, above the ear, with a whitish line above it. Lips whitish.

From snout to vent $2\frac{5}{8}''$. Tail imperfect.

Hab. Persia.

This species appears to be closely allied to *H. trihedrus*, from which it may be distinguished, however, by its smaller ventral scales and tubercles, and by its peculiar coloration.

PENTADACTYLUS KHASIENSIS, Jerdon; Proc. As. Soc. Bengal, 1870, p. 75.

Gymnodactylus khasiensis, Anders. Proc. Zool. Soc. 1871, p. 162.

I have received seventeen specimens of this species from Cherra Punji in excellent condition. The former examples, which made me first acquainted with the species, had become hardened by too strong spirit, and had the close hood so contracted that they had the facies of a *Gymnodactylus*. The recent specimens, however, clearly show that Dr. Jerdon was quite correct in referring them to *Pentadactylus*. The largest specimen measures from the snout to the vent 3″ 2‴, vent to tip of tail 3″ 8‴. It appears to be a common species at Cherra Punji.

EUBLEPHARIS MACULARIUS, Blyth, Journ. As. Soc. Beng. vol. xxiii. pp. 737, 738.

Eublepharis macularius, Theobald, Cat. Rept. As. Soc. Mus. 1868, p. 32; Jerdon, Proc. As. Soc. 1870, p. 75; H. T. Blanford, Journ. As. Soc. vol. xxxix. p. 338.

Body covered with moderate-sized, conical, backwardly pointed tubercles, separated from each other by numerous small flat rounded granules, an arrangement that prevails all over the body as far forwards as on a line with the posterior angles of the eye; before this, the granules narrow in size; and anterior to the front angle of the eye the upper surface of the snout is covered with pointed tubercles, smaller than those of the rest of the body and arranged in a tessellated manner. Nostril oval, in a single plate over the first labial, with a large shield at its anterior superior margin between its plate and the rostral. Ear large and crescentic, the straight anterior margin with a few pointed tubercles. Tubercles on the loins and thighs larger than on the rest of the body. Three shields of different sizes be-

hind the rostral; ten upper and thirteen lower labials. Belly covered with slightly imbricate rhombic scales, increasing in size from before backwards. Tail thick, conical, and verticillated, covered below with quadrangular, rhombic, or almost rounded, slightly imbricate, moderate-sized scales; the upper surface with smaller granular scales, with a median lateral row of rounded or pointed enlarged tubercles. The verticils are defined below by a transverse line of fine granules. Preanal pores in an angular line of thirteen. Eighty-six small cylindrical conically pointed teeth in the upper jaw, and eighty in the lower jaw.

Olive-brown above, covered with numerous deep-black spots, most frequent about the occiput and nape. A black spot from the nostril to the eye. Under surface yellowish.

Length: snout to vent 4″ 10‴, vent to tip of tail 3″ 3‴, head 1″ 2‴, fore limb 4″ 6‴, hind limb 2″.

Hab. Salt range, Punjab; and Amritzur.

This species is closely allied to *E. hardwickii*, from which it is distinguished by the tubercles being separated from each other by flat rounded granules instead of smaller tubercles, and by the arrangement of the tubercles on the head, which in *E. hardwickii* present a tessellated appearance all over the head from snout to occiput; while in *E. macularius* the tubercles are arranged on the head as on the body, as far forwards as the posterior angle of the eye, and anterior to that they gradually assume the paved arrangement. The coloration, too, of these species is markedly distinct; and *E. macularius* is essentially a north-western species, while *E. hardwickii* is confined (so far as is known) to the eastern side of India.

Blyth's type, now before me, is a half-grown individual, and is so bleached that it shows no trace of colouring beyond a uniform whitish hue. His description of the species is almost exclusively directed to the colouring and to a speculation as to the probable colour of the young. He mentions that Mr. Theobald informed him that the species attains to more than double the size ($3\frac{1}{8}$ inches) of the specimen from which he drew up his notes, and that it is remarkable, when alive, for the beauty of its prevailing rosy carneous hue.

Dr. Jerdon's* *E. fasciatus*, from Hurriana, appears to me to belong to this species; for he describes the tubercles as "*larger* and *finer*" than in this species, and less close and narrower than in *E. hardwickii*, which is exactly the character which distinguishes *E. macularius* from the last-mentioned species. The coloration of his single very young and imperfect specimen was exactly that of the young of *E. macularius* as described by Blyth.

Although the difference of colour between the young and adult is very marked, as will be gathered from my description and the account given of the coloration by Blyth and Jerdon (who both describe the young as beautifully banded on the body, with a nuchal and three dorsal white bands), still a careful comparison of

* Proc. As. Soc. Bengal, 1870, p. 75.

my adult with the young type does not reveal any structural character that would entitle me to separate them.

Fig. 3.



Cyrtodactylus yarkandensis.

CYRTODACTYLUS YARKANDENSIS, n. sp. (Fig. 3.)

Upper surface uniformly smoothly granular, some of the granules much larger than the others, especially on the hinder part of the body, none tubercular. Two pointed tubercles on the under surface of the tail at the side of the vent posteriorly; three large tubercles on the side of the tail at the base, the external large and pointed. (Tail absent in both specimens.) Ventral scales small, and those on the throat granular. Nostril over the suture of the first labial and rostral defined in front by the rostral, below by the first labial, and behind and above by a semicircle of two or three shields, the upper one of which is the largest. Ten to twelve upper labials, the first sometimes confluent with the rostral; nine lower labials. Two pairs of chin-shields, the anterior the largest, with the rostral wedged between its plates. (Females, no femoral pores.) Ear small, obliquely oval from above downwards and backwards. Toes moderately long, slender.

Bluish grey, with seven broad blackish waved bands, with a well-marked black posterior margin.

Length: snout to vent 2″, vent to tip of tail —— ?, snout to occiput $\frac{6}{12}$″, length of fore limb $\frac{9}{12}$″, of hind limb $1\frac{1}{2}$″, fourth toe from base of fifth $\frac{4}{12}$″, fifth toe $\frac{3}{12}$″.

This species is from Yarkand; but I can give no information regarding the elevation at which it was found.

AGAMIDÆ.

CALOTES VERSICOLOR, Daud.

I have received seven fine adults of this species from Nasrick with a much more elevated crest than occurs in specimens found in the eastern side of India. They are all coloured in the same way: viz. the general colour is light, rather olive-yellow, the head and the anterior half of the trunk being suffused with pink, which is most intense on the crest and throat; the hinder half of the body is speckled with blackish, and the upper surface of the tail is marked with broad dark-coloured bars. The specimens are much larger

than any I have met with on this side of India, constituting a well-marked western race.

CALOTES MYSTACEUS, D. & B.

I have received twelve examples of this species from Cherra Punji.

CALOTES MARIA, Gray.

This is not an uncommon species in the Khasya Hills. The body of the largest specimen in the museum from that locality measures from snout to vent 5 inches; the tail is unfortunately broken; but in another individual measuring in body 4·8 inches, the tail is 14½ inches long. The elbow, knee, and heel are marked with white; and a white line runs along the outside of the fourth toe. The back in the largest specimen is ornamented by eleven transverse white bands intermixed with reddish; they extend only a short way on to the sides. They are continued on to the tail, where they ultimately resolve themselves into pairs of whitish spots, distributed at regular intervals.

Hab. Cherra Punji, Khasi Hills.

CALOTES JERDONI, Günther, Proc. Zool. Soc. 1870, p. 779, pl. xlv. fig. A.

I have received three specimens of this handsome species, obtained at Cherra Punji. A male and a female have a pale red band along the back and on to the base of the tail, and two rows of white spots at regular intervals on the sides between the fore and hind limbs. The other specimen is uniformly coloured green.

CHARASIA DORSALIS, Gray.

This species occurs as far east as the Rajmahal Hills; and Blanford has found it sixty miles west of Raipur, and, he believes, also on the Godavery.

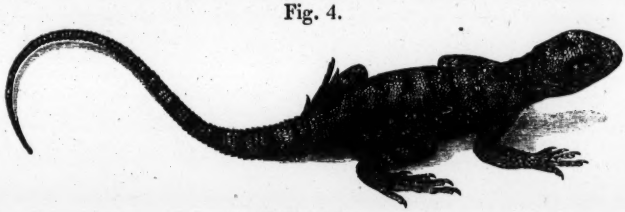
In the young the scales of the under surface are all markedly keeled; but this character is soon all but lost, although traces of it may be detected in adult examples. The cross-rowed character of the scales of the tail is not so marked as on the body, but it can be distinctly detected, although they are imbricate in both localities.

STELLIO PERSICUS, n. sp. (Fig. 4, p. 383.)

The middle line of the back from between the shoulders covered with eight to nine longitudinal rows of very small, rounded, keeled scales of different sizes, those along the vertebral line very small. All the surface external to this, including the sides, very finely granular, with interspersed large granules, chiefly in the axillar region, no scattered spines on the sides. There is a square area on the middle of the sides, covered with enlarged keeled scales of different sizes, arranged more or less in irregularly transverse series. The largest scales are roundly oval, with a rather strong tubercular-like

keel in the centres, whilst the smaller ones, which are the most numerous, are also rounded, but more conical or tubercular than keeled. All the surfaces of the neck very finely tubercular, with numerous little patches of rounded, enlarged, and, in some cases, spiny tubercles, which occur also above and further back than the shoulder.

Fig. 4.



Stellio persicus.

Large strongly keeled scales on the upper surface of both limbs. A few large spined scales along the posterior upper margin of the thigh. Toes long and tapering (5″ 5‴), clawed, slightly compressed, with transverse plates on the under surface, with a strong spine on the angle formed by the lateral and anterior margin. Throat more coarsely granular than the neck; the rest of the under surface covered with very small rhomboidal, slightly imbricate, smooth scales, in transverse rows, as many as fifty in a row, across the middle of the belly. No femoral or preanal pores. Tail slightly swollen at the base, surrounded with regular verticils of strongly keeled scales. Head rather broad; snout short and moderately pointed. Loreal region concave. Nostril round, in a triangular nasal below the canthus rostralis, nearer the end of the snout than the eye, and separated from the upper labials by three longitudinal rows of scales. Three scales between the nasal and rostral. A line of large, more or less linear, keeled, tubercular scales from below the anterior angle of the eye, under the eye to over the ear, where they form a group of large tubercular-like plates. Area in front of and below the ear very finely granular, with large spiny shields at the anterior and inferior margins of the ear. Upper surface of the head covered with numerous small shields, a group of prominent ones in the middle of the frontal region, and another and more extended series on the occiput. All the scales and shields on the snout and sides of the head have numerous dark-brown dots on their margins. Upper labials 12, low and long; 13 lower labials, which are higher and shorter than the upper ones. Several rows of small shields parallel to the lower labials. Mental shield with a small azygos shield behind it, and an enlarged shield on each of its sides, and in contact with the front labial, with a line of five to six enlarged scales behind each. Skin of neck loose, thrown into numerous folds; a strong fold from below the ear to the shoulder, and another below it again; small folds on the nape; two transverse folds on the under surface

of the neck, enclosing short longitudinal folds. The prominent portions of these folds bear patches of more or less spiny tubercles.

Olive above, marbled on the sides and back by about eight narrow, transverse, black bands, which scarcely meet in the vertebral line, and enclosing pale whitish round spots. Tail pale yellowish olive above, with narrow dark olive-brown bands that do not extend to the under surface. Throat yellow, finely marbled with narrow reticulate dark-olive lines. Under surface of belly, limbs, and tail yellowish.

Length: snout to vent $1\frac{12}{42}''$, vent to tip of tail $2\frac{57}{82}''$, snout to occiput 6‴, fore limb 1″ 1‴, hind limb 1″ 8‴.

Hab. Teheran, Persia.

A closely allied species to this is the *S. himalayensis*, Steind., from which the present specimen is distinguished by the abrupt separation of its enlarged dorsal scales from the lateral granules, which in *S. himalayensis*, now before me, pass gradually one into the other—and by the presence of the tubercular keeled area on its sides, which does not exist in the allied species. There are other points of difference; but these are among the most prominent, combined with the difference in coloration.

AGAMA AGILIS, Olivier.

I can add nothing to the characteristic description given of this Lizard by Duméril and Bibron, except as far as regards a point in coloration. In the four specimens before me, of all ages, not only the throat but the belly has longitudinal dark lines, which, however, are more indistinct on the latter than on the former. In one adult, the greater part of the throat, and the sides, and under surface of the neck and the sides of the belly are deep purplish black. All have a deep spot of a similar colour on the side of the neck before the shoulder.

Hab. Shiraz.

Length: snout to vent 3″ 6‴, vent to tip of tail 4″ 8‴, head 11‴, fore limb 1″ 11‴, hind limb 2″ 6‴.

This Lizard is recorded by Blyth from the Salt range of the Punjab, but not included by Günther in his 'Reptiles of British India.' Filippi describes a new species, *A. lessonæ*, from Ispahan.

TRAPELUS RUDERATUS, Olivier.

Scales of different sizes, more or less feebly keeled, with numerous large, rather erect, spiny, tubercular scales scattered over the body, either singly or in groups, more numerous in the males than in the females; some of them, instead of being spinose, are only thickened posteriorly; they pass on to the root of the tail, but not beyond it. Tail a little less than twice the length of the body and head, covered with rhomboidal keeled scales, dilated at its base in the male, and tapering. A fold across the neck, another from the lower angle of the jaw, over the shoulder. A central group of large tubercular furrowed shields on the frontal region, surrounded by slightly smaller ones of the same character; a group of similar shields on the occiput,

and enlarged tubercular, almost spiny, scales on the parotoid region, and numerous spiny tubercles on the nape of the neck. On the sides of the neck the ordinary scales are small and almost granular. A group of large, flattened, furrowed shields on the temporal region, extending forwards to the posterior angle of the eye. Ear oval, its upper margin guarded by 3 to 4 dependent spines, with some tubercles on either side of them; 28 to 32 upper labials; 26 to 29 lower shields, excluding the rostral and mental. Ventral scales smooth, but terminating in a very minute but spinose extremity, about 16 oblique rows between the fore limbs. A transverse row of 14 preanal pores, separated from the margin of the cloaca by about a similar number of pores in a broken line of much narrower and more pointed scales, and with another line of 8 larger pores anterior to the former. No pores in the female. No trace of a crest on the back or neck. Limbs rather slender, digits strong, and armed with long sharp claws, the dorsal ridge of which is black, and the sides horn-yellow. The palms, soles, and under surface of fingers and toes are strongly keeled, each scale terminating in an apical spine.

The colour varies considerably, doubtless either due to the animal having the power to change the hues of its skin, or, it may be, depending on sexual causes. An adult gravid female is a rich reddish buff tinged with greenish on the head, especially on the parotoids, with six transverse bands of oblong pink spots, situated in groups of large spiny tubercles. A very obscure greenish-buff line along the vertebral ridge, terminating on the base of the tail in a bright yellow line, which runs along its middle to its posterior third, with a series of large reddish-brown spots along each side of it, becoming fainter posteriorly. A narrow, wavy yellow line along the back of the thigh and along the side of the base of the tail, broadly but interruptedly margined with blackish. Under surface uniform yellow. The male has the same tint as the female, only more yellow; while the other is slightly darker, with an olive hue. In the former, the red spots are the same, but they are separated on the vertebral line by a stripe of elongated bright yellow spots, which is prolonged on to the base of the tail. The yellow line on the back of the thigh is present, but it is crossed by an intensely black spot. In the latter specimen the vertebral spots have the same character and distribution as in the former, but the transverse bands of red spots are darker red; the line on the back of the thigh is very markedly white, with its dark margins very brightly developed. The upper dark margin is continued on to the tibial portion of the leg, which, along with the outside of the foot, is more or less banded with dark olive-brown. The two lateral spots on the side of the base of the tail are reddish or even yellowish, with dark margins. In both the males the axillæ are metallic pink. In one male the whole of the ventral scales, nearly as far forwards as the axilla, are of a darker and duller yellow than the general colour of the underparts, but they are not perceptibly tumid.

Length: snout to vent 2″ 4‴, 2″ 2‴, 2″ 7‴; vent to tip of tail 3″ 7‴, 3″ 10‴, 3″ 7‴; head 9‴, 7‴, 9‴; fore limb 1″ 4‴, 1″ 3‴, 1″ 5‴; hind limb 1″ 10‴, 1″ 9‴, 1″ 11‴.

Dentition, upper-jaw, m. 13+13=26, can. 1+1=2, inc. 2+2=4.
„ lower-jaw, m. 12+12=24, can. 1+1=2, inc. 1+1=2.

The external incisor on either side of the upper jaw is much larger than the middle pair, but considerably shorter than the canines, with which they can hardly be classed, although Duméril and Bibron speak of four canines and two incisors in the upper jaw.

Hab. Teheran, Persia.

Duméril and Bibron state that the tail of the *Agama mutabilis* is three times the length of the body, which is certainly not the case with the *Trapelus* figured by Olivier, to which the above-mentioned specimens appear to belong.

PHRYNOCEPHALUS OLIVIERI, D. & B.

The five specimens of the peculiar-looking Lizard which I refer to this species, agree with the original description in all its important characters. Duméril and Bibron state, however, "le dessus des membres est recouvert d'écailles carénées," a character which is not applicable to the limbs of my specimens, inasmuch as only one individual shows a few faintly keeled scales on the tibial portion of its leg. I observe, however, that those specimens which have lost the hard epithelial covering of the scales and become shrivelled have an appearance that might be taken for keeling. It seems probable that Duméril and Bibron's specimens may have been in this condition; for in describing the tail, they state that it is "semée de petites verrues," a description applicable to my specimens which have lost their skin, but not to the perfect ones, which have the base of the tail with a few scattered spiny tubercles. These authors describe the scales of the tail as faintly keeled, a character which the specimens before me have as well.

The number of the labials is very variable; in one I count 30 upper and 30 lower plates, whilst in others the numbers mentioned by Duméril and Bibron, 27 and 26, prevail. The extent of the variation in the upper lip is from 27 to 30, and in the lower from 22 to 30. From an examination of a large series of Lizards, both of this and the Geckoid types, I am convinced that the number of labials is not a reliable specific character, although it may be useful as a generic one in a few instances.

There is another point in connexion with this Lizard worthy of notice, and not referred to by original describers, viz. that there is a rounded eminence on each side of the neck, of larger granules than those surrounding it. It is persistent in all my specimens. Those naturalists have also pointed out that what at first sight might strike an observer as an enlargement and flattening of the root of the tail is a character which depends not so much on the tail itself, but on an enlargement of the body before the vent—which, however, to me appears to swell somewhat behind the vent, and then to contract

rather suddenly to the tail proper, which tapers to a very fine point. The tail in all the specimens is nearly the length of the head longer than the body, and appears from its character to be more or less prehensile, although the Museum collector informs me that he found them on a grassy hill-side.

Snout to vent 1″ 10‴; vent to tip of tail 2″ 5‴; snout to occiput 6‴; neck (above) 3‴; anterior extremity 1″; posterior extremity 1″ 7‴.

Hab. Shiraz, Persia.

Prof. Filippi (*l. c.*) records that he obtained many examples of this species.

PHRYNOCEPHALUS CAUDIVOLVULUS, Pallas; Gthr. Rept. of India, p. 161.

Scales granular on body and tail; those on the lower halves of the limbs slightly larger. Ventral scales scarcely larger than dorsal ones. Nasals separated by an azygos scale and a longitudinal pair on each side of it. Two large scales before the anterior angle of the eye, followed by a row of seven smaller superciliaries. A large rounded scale behind the posterior angle of the orbit, removed from the superciliaries. Three or four large median plates above the nasals, the vertex being occupied by plates larger than those of the supraorbital region, but smaller than those on the occiput. All of those scales or plates are smooth. A rather large plate on the vertex between the posterior angles of the eye, with a tumid centre. Upper labials 27 to 29, the one nearest the corner of the mouth the largest. Lower labials 25. Twelve to thirteen teeth in the upper jaw, the one posterior to the first two incisors elongated like a canine. Twelve teeth in the lower jaw, the one posterior to the incisor of its side canine-like. Ear hidden; a fold below the neck and over the shoulder. No anal or femoral pores. Tail slightly dilated at its base, and flattened and rather thick towards its extremity; not prehensile.

Darker or lighter olive-grey above, either with some of the granules paler than the others or all uniform. Dark forms reticulated or spotted with blackish; light forms feebly spotted yellowish and blackish, some with rather large reddish spots, with black borders on either side of the mesial line, most distinctly marked on lumbar region and base of tail. Lips more or less barred or spotted with blackish brown and pale yellowish. Under surface either uniform yellowish greyish white with a slight median blackish band, or with a broad black longitudinal area involving the whole of the throat, the centre of the chest, and expanding on the belly, but not extending as far back as the groin. Under surface of the tail yellowish or greyish white, its sides spotted with brownish almost to the degree of being annulated, the posterior fourth deep black, most distinctly seen on the under surface.

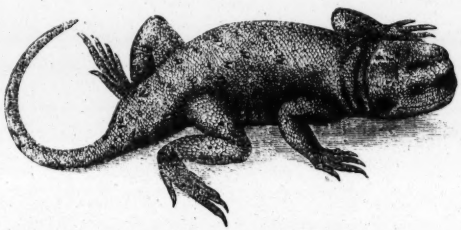
The peculiar coloration of this Lizard would lead me to believe that the black coloration of the belly is either sexual or seasonal.

Vent to snout 2″; vent to tip of tail 2″ 6‴; snout to occiput 6‴; neck 2‴; anterior extremity 1″; posterior limb 1″ 7‴.

Hab. Yarkand.

I have received ten specimens of this species from the foregoing locality; and the number would indicate that it is a common species in the high region of Yarkand and Tibet. Mr. Theobald obtained this Lizard on the shores of the Chomorreri Lake. He describes the female as smaller than the male, and the species as monogamous in its habits, a pair occupying a burrow a few inches deep in the sandy soil, the opening of which is often concealed by a stone or tuft of grass.

Fig. 5.



Phrynocephalus persicus.

PHRYNOCEPHALUS PERSICUS, Filippi, Viaggio in Persia, 1862, pp. 343, 344. (Fig. 5.)

Nostril plates anterior, but separated by five rows of scales. Body covered with small imbricate smooth scales, their tips directed backwards and slightly upwards; sides granular or nearly so; interspersed oval, rather pointed tubercles, either single or in groups of three or five; when more than two or three, one of the tubercles is larger than the others; they are largest on the back and root of the tail, but are not continued on to the tail beyond its basal fourth. Tail with rather small smooth imbricate scales. Two rather flattened tubercular scales above the anterior angle of the eye. Upper eyelid with a fringe of twelve rather oblong scales; lower eyelid with ten larger pointed scales. A group of large tubercles above the region of the hidden ear, and continued forwards to below the middle of the eye. Twenty-four upper and twenty-eight lower labials. Nape with a short obscure crest of five small dark brown rounded spines. A fold across the neck to behind the angle of the jaw (more or less distinct on the nape), whence another is prolonged over the shoulder, marked by two groups of moderate-sized pointed tubercles. Scales on the upper surface of the hinder extremity, below the knee, slightly keeled. Scales of ventral aspect smooth. Rest of tail flattened and laterally much dilated, covered with spiny tubercular scales, rapidly contracting at the anterior

fourth and subconic. Scales of toes serrated; claws pale yellowish, long and pointed. Uniform olive-grey in spirit, almost pale yellow on the hands and feet. Sides of body and upper surface of extremities and of the tail with a few scattered minute blackish spots. A very obscure yellowish spot with a dark blue margin on each side of the neck. Sides of the tail with rather large brownish spots; under surface whitish. The chin and throat obscurely black-spotted. Labials with black spots.

Length from snout to vent 2″; vent to tip of tail 2″ 1‴; snout to occiput 5‴; neck (above) 2‴; anterior extremity 11‴; posterior extremity 1″ 6‴.

Hab. Awada, seven days north of Shiraz, Persia.

Prof. Filippi, who apparently describes the colours from a pale specimen, gives the ground-colour as an earthy, somewhat reddish grey; and the under surface he mentions as a dirty white with somewhat of a rose colour, the throat with vermicular lines forming an azure-grey marbling. He describes the side of the neck with a large indigo ash-coloured spot surrounded by a delicate rusty-coloured band, which the action of alcohol causes quickly to disappear. Some brown angulated spots on the sides of the back are also described by its discoverer, and two similar ones at the base of the tail; after these occur other spots more numerous and more rounded; a few other transverse brown spots on the legs.

Prof. Filippi says that the above markings are quite constant, and that the species is profusely spread over the desert countries of Sultanieh and Teheran.

It is closely allied to *P. helioscopus*, Kaup, from which it is distinguished by the shorter and more rounded head, the long fringed scales of its lower eyelid, the five rows of scales between the nasals, the greater size of the tubercles over the auricular region, their anterior prolongation, along with the more dilated base of its tail.

Fig. 6.



Phrynocephalus maculatus.

PHRYNOCEPHALUS MACULATUS, n. s. (Fig. 6.)

Ear hidden. Scales small, smooth, directed backwards and upwards. A few lines of keeled scales on the lower arms and legs;

scales on the first fourth of the tail smooth, arranged in transverse rows, more or less keeled on the remaining three fourths, forming three longitudinal ridges on the under surface. Ventrals of moderate size, smooth. Head covered on the mesial line with flat, non-tuberculated scales larger than the others; a large oval one occupying the centre of the occiput, with a tumid centre. Nasals separated by three scales one above the other, and a lateral scale on either side of the inferior one. Upper labials 31, increasing in size towards the angle of the mouth, where the largest occurs. The two corresponding to the rostral are more transversely elongated than the others, which are immediately behind, and which are square, rather rounded at their free extremities. Lower labials 26; a longitudinal line of five enlarged scales behind the mental on each side, separated from the labials by a line of smaller scales. Upper eyelid with a fringe of ten oblong scales; lower eyelid margined with ten long, pointed scales. Upper jaw with 10 teeth on either side, the anterior two separated by a considerable interval; 20 in the lower. The teeth gradually decrease in size from behind forwards, showing no indication of differentiation into incisors or canines. The nails are yellowish, long, and pointed. The tail is long and prehensile, exceeding the length of the body by half. Pale yellowish brown; the head pencilled with dark brown and pale yellow; three short, dark-brown longitudinal lines on the nape. Labials minutely punctulated with brownish. The back and sides and upper surface of the limbs with moderate-sized dark-brown spots, and small brown dots of the same colour, with numerous yellow spots either involving one or three scales. Four brown spots, in transverse series, between the thighs. The base of the tail with two transverse brown bands, with a very faint one between them; the rest of the tail with blackish spots along its sides, almost forming rings, but interrupted on the upper surface by small yellow spots nearly constituting a longitudinal line. The last fourth entirely black, separated by a yellow band from a black ring anteriorly. The under surface on the anterior half is rich orange-yellow. Ventral surface generally yellowish white.

Vent to snout 1″ 8‴; vent to tip of tail 2″ 11‴; snout to occiput 5‴; neck 3‴; anterior extremity 1″ 1‴; posterior limb 1″ 9‴.

Hab. Awada, Shiraz, Persia.

This species is distinguished from *P. caudivolvulus* by its smooth scales and peculiar coloration, and by the number of its teeth.

PHRYNOCEPHALUS FORSYTHII, n. s. (Fig. 7.)

Scales small, granular, ovally rhomboidal or quadrangular, smooth, arranged more or less in transverse rows, with a very few enlarged white scales occurring at intervals. No tubercles. Two enlarged scales on each side of the occiput, with a rather large tumid one in the mesial line before them, with those on the vertex only slightly larger than the ones external to them. Superciliary scales small. Scales of the lower eyelid forming a moderately pronounced fringe of ten scales with rounded points. Ear hidden. Nostrils anterior,

separated from each other by three to five longitudinal lines of scales, and widely so from the labial-like ventral by rows of granular-like scales. Twenty-six to twenty-eight upper labials, forming a toothed line. Twenty-six lower labials. A fold across the lower aspect of the neck, continued above the shoulder, and thrown into a number of folds at the side of the neck. Scales of limbs imbricate, almost

Fig. 7.



Phrynocephalus forsythii.

granular, partially keeled. Ventral scales of moderate size, some of them internal to the fore limb, showing a tendency to keeling. No femoral pores. Scales of dorsal surface of tail slightly larger than those on the body, and somewhat imbricate, and arranged transversely. Scales on under surface like those on abdomen, but increasing in size posteriorly, especially on the middle line. Base of tail dilated, with a group of spiny tubercles on the side of the most prominent portion. Tail long and tapering, but not prehensile. A tendency to the formation of a slight crest, by the skin falling into a longitudinal fold in the middle line of the back. Twelve teeth in the upper jaw on each side, with only one incisor, the tooth succeeding it being rather long and canine-like; twelve in the lower jaw, with the same characters and arrangement as in the upper. The last three teeth in both jaws are sensibly larger than the ones preceding them.

Snout to vent 1″ 16‴; vent to tip of tail 2″ 6‴; snout to occiput 5‴; neck 2‴; anterior limb 10‴; posterior limb 1″ 3‴.

Brownish yellow above, with five pairs of dark-brown spots on either side of the mesial line of the back, and a few more obscure ones on the base of the tail. Sides and upper surface of the body generally faintly spotted with brown and yellowish. Cheeks and labials punctulated with dark brown, varying in intensity in different

specimens. Sides and under surface of the tail with brown spots, the under surface of the posterior fourth blackish. Under surface of body yellowish, showing in some a faint blackish line down the centre of the chest and belly.

Hab. Yarkand. (Five specimens.)

Oligodontidæ.

Simotes russellii, Schleg.

Katmandoo, Nepaul. (Two specimens.)

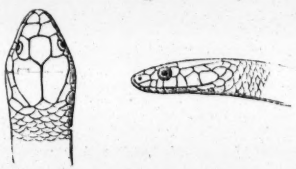
Colubridæ.

Ablabes fuscus, Blyth.

This has all the characters of this species, but its postfrontal is divided. The anterior pair of chin-shields are twice the size of the posterior pair.

Katmandoo, Nepaul.

Fig. 8.



Cyclophis persicus.

Cyclophis persicus, n. s. (Fig. 8.)

Body slightly compressed, tail moderately long. Head distinct from the neck, rather broad across the occipital region. Eye of moderate size. Rostral broader than high. Anterior frontals rounded in front, broader than long. Ventral rather broad, with its lateral margins nearly parallel, its posterior margins slightly rounded. Occipitals large, divergent posteriorly. Nasal much elongated, abruptly truncated in front, and pointed posteriorly, with the nostril in its middle. One anterior and one posterior ocular, the former extending on to the surface of the head. Seven upper labials, the third and fourth entering the orbit, the seventh and eighth the largest. Temporals $1 + 1 + 1 = 3$, the last the longest. Two pairs of chin-shields; the first pair the largest, oblong, rather broad, and in contact with four labials; the posterior pair less than half the length of the former. Fifteen rows of smooth rhomboidal scales, with an apical groove. Ventrals 144, slightly keeled, and extending up the sides. Anal bifid. Subcaudals 77.

Pale olive-brownish, buff above, greenish yellow below. A large black spot on the surface of the head encircling the greater part of the postfrontals and the other shields behind them as far as the

posterior half of the occipitals, giving off a fine line to the nostril and a black ring round the eye. A buff band across the last half of the occipitals, followed by a broad black collar, which passes down on the sides, but does not meet below. Length of body 10″ 3‴, tail 3″ 2‴.

Hab. Bushire, Persia.

COMPSOSOMA HODGSONI, Gthr.

Katmandoo, Nepaul. (Three specimens.)

PTYAS MUCOSUS, Linn.

Katmandoo, Nepaul, and Cashmere. (Eight specimens.)

ZAMENIS PERSICUS, Jan, Iconograph. Gén. des Ophid. 23ᵉ livr. pl. 11. fig. 1.

Zamenis ladacensis, Anders. Journ. As. Soc. Beng. vol. xl. pp. 16, 17.

Since describing *L. ladacensis* I have received the part of Jan's 'Iconographie' containing the figure of *Z. persicus*, with which the former appears to be identical.

I have before me three specimens from Shiraz agreeing with *Z. persicus* in all their structural details, and only differing from Jan's figure in the absence of the black band between the eyes. The largest measures, body 30″ 3‴, tail 10″ 7‴.

ZAMENIS CAUDOLINEATUS, Gthr. *l. c.*

Periops caudolineatus, Gthr., Filippi, Viaggio in Persia, p. 355.

Zamenis caudolineatus, Gthr., Jan, Iconograph. Gén. des Ophid. 23ᵉ livr. pl. iii.

I have received three specimens of a snake from Shiraz and Iswhan, Persia, which I identify with this species, which has been figured by Prof. Jan. The largest individual measures 43″ 3‴, of which the tail forms 10″ 8‴. There are 21 rows of scales in all the specimens, each scale being terminated by two apical pores.

ZAMENIS CLIFFORDII, Schlegel.

Iswhan, fifteen days' journey north of Shiraz.

TROPIDONOTUS STOLATUS, Linn.

Katmandoo, Nepaul.

TROPIDONOTUS NATRIX, Linn.

Snout moderately pointed. Rostral twice as broad as high, hexagonal. Anterior frontals tapering, but transversely truncated anteriorly. Frontals bent well down on the side of the head, larger than the anterior frontals. Vertical moderately broad, with its lateral margin convergent, straight or more or less concave, most so in the young. Occipitals pointed posteriorly and divergent. Loreal quadrangular; one preocular, reaching to the upper surface of the head,

but not in contact with the vertical; three postoculars (one specimen out of six has four postoculars on one side); one large anterior temporal in contact with the two lower postoculars. A pair of posterior temporals touching the upper posterior angle of the last or seventh labial. Upper labials 7; sometimes 8, by the division of the second (this occurs in two specimens out of six). In the normal number, 7, the third and fourth enter the orbit, and in the latter case the fourth and fifth. The fifth labial is by far the largest. Nineteen rows of strongly keeled scales round the body. Scales elongate and leaf-like, and slightly notched at their free extremity. Ventrals vary from 177 to 180; subcaudals from 71 to 77.

Adults either uniform dark olive-black above, with indications of two longitudinal pale-coloured dorsal bands by some of the scales at regular intervals being more or less tinged with light brownish, or general colour dark olive-brown, with two longitudinal pale brown bands the breadth of two lines of scales. The bands and sides with rather obscure black spots, a scale's length, at regular intervals of from two to three rows, the ones on the sides alternating with those on the bands. Under surface yellowish anteriorly, with large bluish-black spots, which become larger and more numerous from before backwards, till at last the yellow is entirely replaced by the spots, the hinder part of the belly and the whole of the tail being deep black. In the young the confluence of the spots is not so perfect, and the ground-colour on the under part of the body is bluish grey. A transverse pale yellowish brown band from the angle of the mouth to the posterior extremities of the occipitals, very indistinct on the centre of the neck; a large black spot behind each, the small lateral spots being as it were a continuation of them. Upper labials yellowish, with black margins, those of the fourth, fifth, and sixth being very intense.

Largest specimen measures from snout to vent 38″ 3‴, tail 10″; total 48″ 3‴.

Hab. Rehst, on the Caspian Sea.

The Caspian specimens belong to a melanoid form of this species, probably the var. *atra* of Nordmann.

TROPIDONOTUS HYDRUS, Pallas.

I have received five specimens of this snake—one from Rehst, on the Caspian Sea, another from Shiraz, Persia, and three young specimens from Teheran. The first is not adult. It is dark-olive brown, covered at regular distances with black spots tending to form transverse bands. The last seventh of the belly and the whole under-surface of the tail are quite black. Its prefrontals are pointed; it has three anterior oculars and four postoculars; eight upper labials, the fourth only entering the orbit; and nineteen rows of strongly keeled scales. The Shiraz specimen is a light yellowish olive, with black spots, those on the back being placed obliquely; those on the side alternating with the former, and only distinguished by the black skin and edges of the bases of the scales. Two or three of the scales between each of these dark areas are more or less margined with

bright yellow, almost forming a series of yellow transverse bands on the side and between each of those above; one or two of the scales are longitudinally margined with a like colour. The under surface of the posterior five sixths of the body is much finely spotted or punctulated with black, and the last sixth is almost wholly black, as is the under surface of the tail. This specimen has nineteen rows of scales, pointed prefrontals, only two anterior oculars and three postoculars; but it is evident, from the way in which the superciliary shield is prolonged down behind the eye, that it is confluent with the fourth postocular; eight upper labials, the fourth entering the orbit.

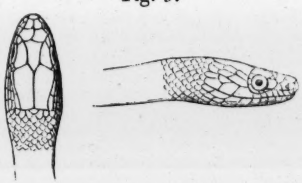
This species is recorded by Prof. Filippi in his work on Persia.

Dendrophiidæ.

Gonyosoma dorsale, n. sp. (Fig. 9.)

Rostral rather prolonged on to the top of throat. Head elongately oval and rather pointed. Anterior frontal quadrangular, rounded in front, nearly as large as the posterior frontals. Loreal subquadrangular. Two anterior oculars, the upper one large, and reaching the vertical; the inferior ocular evidently a separated portion of the fourth and fifth labials. The fourth labial also divided below the posterior half of the loreal. Fifth and sixth labials entering the orbit, the sixth prolonged backwards before the seventh labial, which is the largest. Two posterior oculars; vertical rather elongate. Lateral margins rather deeply concave.

Fig. 9.



Gonyosoma dorsale.

Occipitals rather large, and nearly oblong, abruptly transversely truncated behind. Temporals 2+3+4=9. A line of elongated temporals along the occipitals, and another similar line along the labials. The two anterior shields of each of these lines in contact, the remainder of the lines enclosing three other shorter temporals. Scales smooth, long, lanceolate, with an apical groove, in nineteen rows. Ventrals keeled, prolonged up the side, 227; caudals 107. Anal bifid.

Pale yellowish green above, with a bright pink longitudinal band from the posterior extremity of the vertical on to the base of the tail, where it disappears. Under surface bright yellow. Area round the

eye yellowish, with a small black speck below the eye; a faint blackish green one behind the eye, and another at the angle of the mouth, continued more or less into each other. Length of body 23″; tail 8″ 2‴.

Hab. Shiraz, Persia.

CHERSYDRUS GRANULATUS, Schneider; Gthr. *l. c.* p. 336.

A specimen of this snake, 36 inches in length, from the sands of the Puri beach. The smaller scales that cover the sides have thin keels, each distinctly terminating in a minute recurved spine. In the Indian Museum, Calcutta, there is another specimen of this snake, from the mouth of the Hughli, so that its distribution is from the southern to the northern extremity of the western side of the Bay of Bengal; and it is probable that it will be found to have a corresponding distribution on the eastern side of the same sea.

HYDROPHIS CHLORIS, Daud.; Gthr. *l. c.* p. 70.

The specimen referred to this species measures $2\frac{5}{8}$ inches. The length of the long thin neck is more than one third of the total. There is one postocular; the third and fourth labials enter the orbit, the former being widely separated from the nasal by the preocular and rather large second labial. Two rather large, nearly equal-sized temporals. Two pairs of chin-shields, in contact with each other. Thirty-three rows of scales round the neck, very fully keeled, with a minute, nearly apical tubercle. Ventrals 495, distant on the neck, where they are about twice as large as the neighbouring scales; but they are relatively smaller on the thick part of the trunk. Four anal shields, the external scales being large. The dorsal half of the trunk is greenish olive, and the ventral half yellowish. Fifty-three blackish bands encircle the body, their dorsal halves being very black, broad above and narrowing to the middle line, and the ventral halves very faint on the thick portion of the body, but quite distinct along the ventral line, where they are connected with each other by an obscure black band. On the neck the transverse rings are very black, and so broad that the yellow interspaces are reduced to pairs of round spots, the head and under surface of the neck being quite black. Length $27\frac{5}{8}$ inches.

HYDROPHIS GRACILIS, Shaw.

I have received a specimen from Puri, with all the characters of this species as diagnosed by Günther. It has twenty-one rows of bitubercular scales round the neck; 232 ventrals, those on the neck nearly twice as large as the adjoining scales, while those on the compound limb are divided into two halves, placed opposite each other, each half bearing two tubercles as the ordinary scales.

Length $33\frac{3}{8}$ inches, of which the tail is $2\frac{7}{8}$.

HYDROPHIS LINDSAYI, Gray; Gthr. *l. c.* p. 371.

With the exception of having only twenty-six rows of scales round the neck, and 455 ventrals, very few of which are divided, a

Hydrophis which I have received from Puri differs in no other respect from *H. lindsayi*. It measures 27 inches in length.

HYDROPHIS STRICTICOLLIS, Gthr.

Head small, neck long and slender; scales not imbricate; thirty-seven round the neck, having either one or more tubercles in a straight line, tending to form an obscure keel; the central tubercle is the largest, the others very indistinct. On the posterior five sixths of the trunk there is one central tubercle to each scale. The ventrals are 385 in number, and on the anterior two thirds of the trunk are twice as broad as the adjoining scales. They show a distinct tendency to division, and are marked by a central groove, which nearly divides them; each half is marked by a central tubercle and a very obscure one behind it. There are six small anal scales, the middle one of the three of each side being the largest. Five upper labials, with a scale-like shield behind the last. The second upper labial is the largest, and touches the preocular. One postocular, with a single large temporal behind, which is as high as broad, rests on the scale-like posterior labial. Two pairs of chin-shields in contact with each other; fifty-one blackish rings round the trunk, broader than the groundwork between them, not confluent on the under surface, but running together on the back from behind the anterior third of the trunk. Tail with eleven vertical blackish bars, confluent on the under surface.

Length, snout to vent 36″ 6‴; vent to tip of tail 3″.

Hab. Sandheads, mouth of the Hughli river; Bay of Bengal.

HYDROPHIS SPIRALIS, Shaw; Gthr. *l. c.* p. 366.

I have received what appear to be two young specimens of this species from Pooree, Cuttack, measuring respectively 22 and 16½ inches. The former has twenty-nine rows of scales round the neck. The scales are imbricate on the trunk, with a central tubercle. There are 332 ventrals, generally twice the size of the scales adjoining them; and almost all are undivided. The rostral, although it is well prolonged upwards, is broader than high. The third and fourth labials enter the orbit. There is only one postocular; and of the three temporals, the first is much the largest. Two pairs of chin-shields, the posterior being only slightly smaller than the anterior pair, and both are in contact. There is a black line from the rostral to the eye; but the rostral and the upper labial margin are yellowish white, and the whole under surface of the chin and throat are of the same colour. The upper surface of the head, from the frontals to behind the occipitals, is blackish, but more or less spotted with dirty yellowish, a spot occurring in the centre of the vertical and of each occipital. A faint, short, blackish line from the angle of the mouth either backwards or slightly upwards; fifty-nine black rings round the trunk, interrupted on the sides in the greater part of its extent, but perfect on the neck. These perfect or imperfect rings are broadest on the ventral surface, and on the neck they are connected with each other by a black line running along the ventrals.

Where the dorsal and ventral segments are not connected, the latter form rather broad, almost cone-shaped markings; the upper surface corresponding to the dorsal segments is dark olive, owing to the basal half of each yellow scale being black. The lower half of the length of the snake is rather bright yellow; after the twelfth ring from the head there is a round black spot on the dorsal surface between the rings, one or two blanks occurring only here and there. The latter half of the tail is black.

In the second specimen the shields of the head and scales are as those of the species; but I only count twenty-six rows of the latter round the neck, and 283 ventrals, which on the neck are rather more than twice as large as the neighbouring scales. The ventrals are undivided, and distinct throughout the whole length of the trunk. There is the black line from the rostral along the upper lip, the lower half of which is yellowish white, along with the chin, throat, and greater part of frontals; it is olive over the eye and temporals. From the posterior border of the frontals backwards to the hinder edge of the occiput, and including the two internal temporal shields, is black, with a faint yellowish spot in the centre of the vertical and each occipital. The trunk is encircled with forty perfect black rings, broadest on the back and ventral surface; on the latter region the rings are all connected with each other by a black longitudinal line twice the breadth of the ventral scales. One round, dorsal, black spot occurs between the second and third rings, but it is partially connected with the former. Between the sixth and seventh rings from the tail, another similar but separate spot occurs; and the coloration of the part of the body where it is placed represents exactly the coloration of the type of the species. The dorsal half of the body is coloured as in the former specimen; but its ventral half is not so light in colour—a circumstance which may be due to its greater youth.

HYDROPHIS CANTORIS, Gthr. *l. c.* p. 374.

I have received a young *Hydrophis* (also from Puri, and measuring 20⅝ inches in length) that fully agrees with Günther's diagnosis of the above species. The elongated neck is nearly one half of the total length of the snake; the rostral shield is much longer than broad, and produced backwards, its hinder margin being in a line with the posterior upper angle of the first labial. The third labial is in contact with the nasal. The third labial enters the orbit, while the fourth is subocular; the postocular and two large temporals on each side of the elongated occipitals. Two pairs of chin-shields in contact with each other. Twenty-six rows of scales round the neck; 443 ventrals, those on the neck twice as large as the adjoining scales, and those on the compressed part of the body divided into two, or distinct, each with two central tubercles. Six small anal shields. Head and belly entirely black; the body surrounded with fifty-three black transverse bands, nearly all of which are confluent with the black of the under surface, and many of them with each other on the back, so that the greenish yellow of the ground-colour forms large

oval lateral spots. The first fourteen black bands of the neck are not confluent above, but are separated from each other by light greenish-yellow bands half the width. On the posterior half of the thick part of the body the black bands extend only halfway down the side. The tail has eight black vertical bands; and the tip is black. The coloration is intermediate in this specimen to what Günther describes it in the adult and young.

HYDROPHIS NIGRA, n. sp.

Neck but moderately slender, less than two thirds the length of the body. Head broader than neck, but long and oblong, with nearly straight sides, the preorbital breadth equalling the temporal diameter. Snout moderately long, broad and rounded, and rather spatulate. Rostral much broader than high (only feebly notched on its inferior surface), its posterior extremity being in a line with the rostro-labial suture. Nasals broader posteriorly than they are long. The third labial is not in contact with the nasal, and it enters the orbit, from which, however, it is almost excluded by the fourth labial. One postocular. The fifth and sixth labials are divided transversely. Two temporals, of which the anterior is the largest. Two pairs of chin-shields, the anterior in contact, the shields of the posterior pair separated by an azygos scale. Thirty-two rows of scales round the body, slightly imbricate, and elongately hexagonal, smooth. Ventrals 248; the first twenty-five or so sometimes as large as the adjoining scales, which are rather small. They diminish in size as they are traced backwards, but nearly all remain distinct and undivided. Three pairs of anal shields, of which the outer are the largest. Uniform intense black, without any true markings. Length 19 inches, of which the tail is 2 inches; length from vent to occiput $\frac{7}{12}$; breadth at angle of mouth $\frac{4}{12}$; breadth before eyes $\frac{4}{12}$; breadth in a line with nasal suture $\frac{3}{12}$; snout to eye $\frac{3}{12}$; eye to angle of mouth $2\frac{1}{2}$ lines; angle of jaws to tip of snout 8 lines.

Hab. Puri, Cuttack coast, India.

HYDROPHIS CRASSICOLLIS, Anders. Journ. As. Soc. Bengal, 1871, p. 19.

I have received another specimen of this snake from Puri. It measures $57\frac{3}{8}$ inches, and is slightly lighter-coloured than my first specimen, and with the transverse bands much narrower. The upper surface of the head is coloured as in the type; but the chin and labials have a clear gamboge-yellow tint, and from the angle of the mouth there is a distinct similarly coloured yellow line passing backwards to the yellow longitudinal area of the side. The under-surface, except where the transverse black bands occur, is a clear, warm, yellowish white. I count 326 ventrals, and twenty-six rows of scales round the neck.

HYDROPHIS STEWARTII, n. sp.

The neck moderately long and slender, and the head rather short

and not much broader than the neck; the remainder of the body much compressed. Rostral considerably broader than high. The nasals as broad posteriorly as their common suture is long. The third and fourth labials enter the orbit, the former not being in contact with the nasal. Three temporals, the anterior being the largest. Two postoculars. Vertical much pointed behind. Occipitals long and narrow. Two almost quadrangular chin-shields in contact with each other. Thirty-three rows of scales round the neck. The scales hexagonal, not imbricate, with a feeble central tubercle. Ventrals 387, smooth, the first forty on the neck being about four times as large as the adjoining scales, those behind them becoming small and narrow as they are traced backwards, and hardly discernible on the last 6 inches of the trunk. Two pairs of small scale-like anals. Tail broad and markedly dilating from its root. Lips yellowish; upper surface of head, upper half of neck, and dorsal two fifths of compressed portion of body greenish olive; undersurface of head and all the remaining portion of the neck and body salmon-coloured. Fifty-seven very obscure darker olive, almost black rhomboidal bars on the dark dorsal area, and not extending on to the light-coloured sides. The tail pale greenish olive, mottled and tipped with black.

Length 38″ 3‴, of which the tail constitutes 2″ 8‴; girth round neck 2 inches, behind head 2″ 5‴; greatest depth of body (5 inches before tail) 1″ 8‴; greatest thickness at last-mentioned point 6‴; thickness at upper margin of lower third in same locality 3‴; thickness at ventral margin 3″ 2‴; snout to occiput 11‴; breadth across gape 7‴.

Hab. Puri, Cuttack.

Hydrophis viperina, Schmidt; Gthr. *l. c.* p. 378.

I have received a specimen of this snake, also from Puri, with thirty-two rows of scales round the neck and with 268 ventrals. The first thirty-five or forty ventrals are six times as large as the adjoining scales. Beyond these the ventrals decrease in size, and ultimately are not much larger than ordinary scales. The third labial does not reach the orbit, below which are the fourth and fifth lip-shields. The latter labial and the sixth and seventh are transversely divided, as is also the first large temporal on the right side. The nasals are broader posteriorly than they are long; and the dimensions of the vertical in these directions hold a similar relation to each other. Two posterior temporals. Scales keeled. The upper surface of the head and of the body generally is dark olive, without any trace of spots or markings of any kind; and the sides, upper lips, and under surface are yellowish. Length $29\frac{5}{8}$ inches, of which the tail is 3 inches; snout to occiput $\frac{6}{8}$ inch; breadth across gape $\frac{5}{8}$ inch; breadth in a line with posterior margin of nasals $\frac{4}{8}$ inch.

I have received another specimen, which appears to be the young of this species. It measures $13\frac{1}{2}$ inches, of which the tail forms

$1\frac{5}{8}$ inch. It has, however, thirty-two rows of scales round the neck, 210 ventrals, and three præanal shields on one side and two on the other. It has twenty-six black rhombic spots on the back, continued as vertical bars on to the sides, and confluent on the ventral shields, which are wholly black and six times as large as the neighbouring scales, which are smooth. It has on either side a minute detached præocular.

I have received from Muscat, Arabia, another specimen of this species, measuring 27 inches, of which the tail forms $2\frac{5}{8}$, with 238 ventrals and twenty-six rows of keeled scales round the neck.

Two other specimens from Puri have been sent to this Museum since the above was written; and I am inclined to regard both as forms of *H. viperina*. They are young, and measure respectively $13\frac{1}{8}$ inches, of which the tail forms $\frac{1}{2}$ inch, and $11\frac{6}{8}$, of which the tail is $1\frac{3}{8}$ inch. The first specimen has twenty-eight rows of scales round the neck and 267 ventral shields, while the second has twenty-nine cervical rows and 255 ventrals. Both have three pairs of anal shields; but as the condition of these shields in the above-mentioned young specimen would appear to indicate that these structures are variable in their number, too much importance cannot be attached to their numerical increase in the specimens under consideration as compared with the type. The third labial does not enter the orbit. On one side in one specimen there are two præoculars. The first temporal, on both sides in one specimen and on one side in another, is considerably higher than broad; while on the remaining side of the last and on both sides of the former a narrow temporal, longer than high, is separated, as it were, from the great anterior temporal.

These three young specimens were caught at one haul of a net, which would appear to indicate that the young of this species swim in shoals. When adult Hydrophides are caught in the net, there are, as a rule, always two or three of a species.

As one of these young snakes killed a chicken that it was made to bite, the species would appear to be endowed with an active poison.

Hydrophis jerdoni, Gray; Gthr. *l. c.* p. 362.

I have received a specimen from Puri measuring $38\frac{6}{8}$ inches in length, the tail measuring 4 inches.

Enhydrina valacadyen, Boie.

One specimen, from Puri, with a divided postocular on one side.

Crotalidæ.

Trimeresurus monticola, Gthr.

Katmandoo, Nepaul.

Halys himalayanus, Gthr.

I have received a Pit-viper from Goduk which may be provisionally referred to the above species. It has, however, its anterior frontals in a straight transverse line, as in *H. pallasi*, and only the

second large temporal confluent with the sixth labial. In these characters it is intermediate between the two species. I have another specimen before me with the divergent anterior frontals of *H. himalayanus*; but it has only the sixth labial confluent with the middle temporal. In the first-mentioned specimen the anterior are nearly as large as the posterior frontals; but in the second they are considerably smaller than the hinder frontals, which are more or less pointed anteriorly. If this individual had had its small anterior frontals in a straight transverse line, with only one temporal entering the lip, it might with equal propriety have been referred to one or other of the two species. The bearing of these variations is apparent. The colouring is as described in the 'Reptiles of British India.'

Batrachia salienta.

Rana esculenta, Linn.

Vomerine teeth in a transverse row between the inner nostrils. These specimens have the membrane reaching to the extremity of the outer margin of the first, second, and third toes and to the end of the inner margin of the fifth. The third and fifth toes are nearly equal, the last being, if any thing, longer than the first-mentioned; but to all practical purposes they may be regarded as equal. The fourth is one third longer than the third and fifth. The internal tubercle is oblong and laterally compressed, and of moderate size; the external tubercle round and obscure. The lateral glandular fold is never pale-coloured; and the dorsal white line occurs in four out of twelve specimens. The dark band along the canthus rostralis and over the tympanum can be faintly detected in a few. There are no true dorsal glandular folds; but the back is covered with rounded, not prominent, glandular spots.

General colour dark olive, profusely or sparsely covered with black spots; the limbs either banded or black-spotted. Some specimens have the under surface of the hind limbs with one or two black spots; while others have a much larger number, and the spots of the side extending on to the belly, while the whole of the under surface is more or less very obscurely apparently reticulated with blackish, but so faintly that it is hardly noticeable.

These specimens are larger than the European examples of the species, seven out of the twelve exceeding 3 inches, the largest measuring 4″ 1‴ from the snout to the vent, and the hind limb 6″ 7‴.

Hab. Shiraz, Persia.

Rana cyanophlyctis, Schneid.

Hab. Katmandoo, Nepaul.

Rana gracilis, Wiegm.

Hab. Katmandoo, Nepaul.

Bufo viridis, Laur.

I have received seven specimens of this species from Shiraz,

Persia. The largest is a very characteristically and highly marked specimen, measuring 3″ 11‴ in length, and the hind limb 4″ 3‴. The coloration is exactly that of Laurenti's figure*. The others are young, and their colours are comparatively dull, the spots fewer and even proportionally smaller than in the adult.

The Museum collector also gathered, in the Himalayas, on his way to Ladak, seven specimens of a toad agreeing in every way with the young specimens from Shiraz. This species, however, had been previously obtained at Simla by Dr. Stoliczka.

HYLORANA ERYTHRÆA, Schl.; Gthr. *l. c.* p. 425.

I have received a young specimen of this frog from the Garo Hills, to the east of the Brahmaputra. The area between the two glandular lines is deep black; and there is a narrow black band along the dorsal margin of the uppermost glandular fold from above the eye to the side of the vent. The posterior surface of the fore and hind limbs marbled with deep brownish, a light line from the vent along the back of the thigh. In all its other characters it agrees with the characters given by Günther.

Length of body 1″ ½‴; vent to heel 11⅓‴.

This species appears to extend as far west as Eastern Bengal, the fauna of which is decidedly much more Malayan than Indian properly so called.

POLYPEDATES ANNECTENS, Jerdon, Proc. As. Soc. Beng. 1870, p. 83, 84; Anders. Proc. Zool. Soc. 1871, p. 210.

I have received twelve specimens of this handsome species from the southern slopes of the Shillong plateau of the Khasia hills.

The largest specimen measures as follows:—

Snout to vent 1″ 7‴; vent to tip of fourth toe 2″ 6¼‴; vent to knee 8¾‴; knee to heel 8½‴; heel to tip of fourth toe 1″ 1‴; length of fourth toe 8‴. These measurements of the hind limb show the difference of only ¼ of a line between the dimensions of it and of the specimen formerly described by me.

RHACOPHORUS MACULATUS, Anders.

Rhacophorus reinwardtii, Jerdon, Proc. As. Soc. Beng. 1870, p. 84.
Rhacophorus maculatus, Anders. Journ. As. Soc. Bengal, vol. xl. p. 27.

This Museum has received seven other specimens of this frog from Shillong, on the Khasia hills. They in no way differ from the original specimens from which the species was described.

HYLA ARBOREA, Linn.

The specimens from the undermentioned locality have the dark lateral streak narrow and margined by a broader yellowish-white line. A dark transverse band over the vent, margined above with a pale band similar to the former. A pale dark streak from the knee

* Syn. Rept. p. 111, pl i. fig. 1.

along the outer side of the leg to the fifth toe, margined posteriorly with pale yellowish. No spots. The membrane of the fingers very rudimentary; the toes two thirds webbed.

Hab. Rehst, Caspian Sea.

EPICRIUM GLUTINOSUM, Linn.

There is a median longitudinal fold from the symphysis of the lower jaw backwards as far as the length of the gape behind the angle of the mouth, abruptly defined posteriorly by a transverse fold separate and distinct from the body-folds but only reaching the sides. About halfway between it and the angle of the mouth there is another permanent fold that nearly encircles the body, but is interrupted behind the occiput. Anterior to this fold there is a short indistinct transverse fold on the throat, slightly posterior to the angle of the mouth.

The upper and under parts are not black, as described by Günther, but a rich slaty blue, the lateral line, however, being yellow. Whenever the specimens are removed from spirit they become dark brown, almost black.

I have received this species from Goalpara, Assam, and from Shillong, in the Khasia hills.

6. Catalogue of the Birds found in Ceylon; with some Remarks on their Habits and Local Distribution, and Descriptions of two New Species peculiar to the Island. By E. W. H. HOLDSWORTH, F.L.S., F.Z.S., &c.

[Received February 21, 1872.]

(Plates XVII.–XX.)

In the following Catalogue I have endeavoured to give a correct account of what is known at the present time of the birds resident in and visiting Ceylon. I have included no species about which there appears to be any doubt, except in a few cases; and in those cases I have mentioned the grounds on which their reported occurrence seems likely to be true.

The latest original list of Ceylon birds is that comprised in Mr. E. L. Layard's valuable and generally trustworthy "Notes on the Ornithology of Ceylon" published in the 'Annals and Magazine of Natural History' for 1853–54. Since that time there has been hardly any one in Ceylon who has given systematic attention to the avifauna of the island; and in the preparation of this Catalogue the considerable collection of birds made by myself and Mr. Layard's "Notes" have been the principal materials I have had at my command. I have been able, however, to make use of the extensive knowledge of eastern birds possessed by Lord Walden, the President of this Society, and his large collection of specimens, both of which



ERYTHROSTERNA HYPERYTHRA, J. & S.


BRITISH
280673
MUSEUM



J. Smit lith. M&N Hanhart imp.

BRACHYPTERYX PALLISERI.

BRITISH MUSEUM
2806.73



$\frac{2}{3}$

J. Smit. lith.

M&N Hanhart imp.

1. ARRENGA BILIGHI ♂, 2. ♀ *juv.*

BRITISH MUSEUM
280C73



J. Smit lith.

M.& N. Hanhart imp.

1. ZOSTEROPS, PALPEBROSUS.
2. ..... CEYLONENSIS.

BRITISH
2800c73
MUSEUM

have been most kindly placed at my service; and they have been of great assistance to me in determining questions of species and nomenclature. I am glad also to acknowledge the help I have received from Mr. J. H. Gurney, Mr. Edmund Harting, Mr. Howard Saunders, and others, in the different groups of birds to which those gentlemen have given their special attention.

Mr. Layard's industry during his eight years' residence in Ceylon resulted in more than doubling the number of birds known in the island; and he did not leave much for his successors to find out in the low country, where he principally worked. His list included 315 species; but I have found it necessary to omit a few which appear to have been wrongly identified or to have been recorded by the late Dr. Kelaart on doubtful evidence. I have added 25 species which have been met with during the last few years, and among them two birds hitherto undescribed, making altogether 325 species which apparently have a good claim to be regarded as belonging to the avifauna of Ceylon.

The number of birds not hitherto recognized out of Ceylon is remarkably large considering its small extent of country (equal to only five sixths of the size of Ireland). A few species at one time thought to be peculiar to the island have since been recognized, or are believed to be found, in India or Malacca; but, so far as is known, the following 37 species are exclusively confined to Ceylon, and are pretty evenly divided between the low country and the hills, most of them, however, being found only in the southern half of the island. They form one ninth of the known Ceylon species.

Birds peculiar to Ceylon.

Athene castaneonota.
Tockus gingalensis.
Palæornis calthropæ.
Loriculus indicus.
Chrysocolaptes stricklandi.
Brachypternus ceylonus.
Megalaima zeylanica.
—— *flavifrons.*
Xantholæma rubricapilla.
Centropus chlororhynchos.
Phœnicophaës pyrrhocephalus.
*Prionochilus vincens**.
Eumyias sordida.
Erythrosterna hyperythra.
Buchanga minor.
—— *leucopygialis.*
Dissemurus lophorhinus.
Brachypteryx palliseri.
Arrenga blighi.
Geocichla layardi.
Merula kinnisi.
Oreocincla spiloptera.
Alcippe nigrifrons.
Drymocataphus fuscocapillus.
Pomatorhinus melanurus.
Layardia rufescens.
Garrulax cinereifrons.
Rubigula melanictera.
Drymoipus validus.
Zosterops ceylonensis.
Cissa ornata.
Temenuchus senex.
Eulabes ptilogenys.
Munia kelaarti.
Palumbus torringtoniæ.
Gallus stanleyi.
Galloperdix bicalcarata.

* Recently discovered by Mr. Legge, R.A. A notice of this species is given in a postscript to this Catalogue.

Excepting *Phœnicophaës* and *Prionochilus*, which are quite Malay forms, all these peculiar Ceylon species belong to genera found in India. Most of these genera range from India more or less to the countries east of it; and the nearest allies of *Cissa ornata* are almost confined to Eastern Asia.

I have not included *Batrachostomus moniliger* or *Kelaartia penicillata* among the species peculiar to Ceylon, as they are believed to be found also in South India; and I have likewise omitted *Malacocercus striatus*, as I much doubt its distinctness from *M. malabaricus*.

Geographical distribution.—In this Catalogue I have given approximately the geographical range of most of the species found in Ceylon, from which it will be observed that all those not peculiar to the island are, with very few exceptions, known in India; the majority of them extend to Burmah, many of them to some of the Malay islands and China, and a few to Australia. *Goisachius melanolophus* is a remarkable example of a common Malaccan species having four times been found in Ceylon, and, strangely enough, only on the west side of the island, although it has not yet been observed on the adjoining Indian continent. A converse example exists in *Hirundo hyperythra*, of which one or two specimens have been brought from Malacca, that species being otherwise considered quite peculiar to, as it is abundant in, Ceylon.

The Ceylon birds which range to the westward of India belong to species of generally wide distribution, and consist principally of Raptorial, Grallatorial, and Natatorial forms; the exceptions being examples of *Hirundo*, *Cypselus*, *Halcyon*, *Ceryle*, *Cuculus*, *Cisticola*, and *Pyrrhulauda*.

Of the species which extend to Australia those belonging to *Calobates*, *Strepsilas*, and *Terekia* are of very wide distribution; the Ceylon species of *Haliaëtus*, *Excalfactoria*, *Charadrius*, *Ægialitis*, and *Mycteria* have a considerable range east and south-east of India; and *Attagen minor* and *Sterna gracilis* seem alone to be, so far as is known, especially Australian.

Indian families absent from Ceylon.—The *Vulturidæ*, *Eurylaimidæ*, *Pteroclidæ*, *Otididæ*, *Glareolidæ*, *Gruidæ*, and *Mergidæ*, all families included in the Indian avifauna, have no recognized representatives in Ceylon. Of the *Vulturidæ*, one species breeds so far south as the Neilgherries; but Ceylon agrees with the Indian archipelago and the countries south of continental Asia in having no Vulture. The *Eurylaimidæ* have their stronghold on the eastern side of the Bay of Bengal and in the Malay islands; and a representative of this family may yet be found in Ceylon. It is also not improbable that stragglers of the common South-Indian species of *Pteroclidæ* and *Otididæ* may one day be met with in the north of the island. *Glareola* may likewise be looked for; but the *Gruidæ* and *Mergidæ* are not likely to range so far south.

Position and Character of the Island.—Without entering into the question of whether Ceylon was originally a continuous portion of India or formed part of a lost Malay continent, as believed by the late Sir J. Emerson Tennent, it may be desirable to point out the

principal features of the country as it now stands. Its position (between 6° and 10° N. lat.) is almost equatorial. Practically it is an island about 35 miles (at its least distance on the extreme north) from India, increasing to nearly 60 miles at the connecting sandbank of Adam's Bridge, and to about 150 miles between Colombo and Cape Comorin. It possesses the character of a true oceanic island in having deep water (no bottom at 150 fathoms) within a very few miles of the land all round the coast, excepting only between Adam's Bridge and Point Pedro, the parts of the island nearest to India. The water shoals abruptly on the south side of Adam's Bridge, and has only a depth of a few fathoms north of it until it passes the line between the north point of Ceylon and the nearest part of India, whence it gradually deepens into the Bay of Bengal. Adam's Bridge, the narrow connecting-link between Ceylon and India, and said to be of comparative recent formation, consists of sandstone covered with loose sand, which is alternately beaten up on and removed from the north and south sides by the sea and wind during the successive north-east and south-west monsoons. It terminates on the Indian side in the island of Ramisseram, between which and the continent is the well-known Paumben Channel. On the Ceylon side the bridge ends in the island of Mannar, which is separated from the mainland by a considerable expanse of shallow water or mud banks, according to the state of the tide, with a narrow winding channel deep enough for the passage of small native vessels. The bridge itself has also several narrow openings or "scours" at different parts, so that, although Ceylon is virtually connected with India by means of Adam's Bridge, it may be regarded as practically distinct, and, as might be expected, it has species peculiar to itself in all the great divisions of the animal kingdom. Its length is 271 miles and its greatest breadth 137 miles.

For ornithological purposes Ceylon may be divided into two parts —the northern and southern halves, the northern portion being, with the exception of a few isolated hills, entirely low country; this is continued throughout the maritime districts of the south; and the whole coast is surrounded by a narrow belt of sandy beach. The low country generally is extensively laid out with paddy-fields; but there are large tracts in the northern half of the island which are still in the normal condition of forest, or, from the poverty of the soil or the scarcity of rain, are only occasionally cultivated, and support a scattered growth of bushy jungle rarely attaining the character of forest. This last was the nature of the country round Aripo, where I spent a good deal of time and obtained a great number of the commoner birds. At the north and on the north-east side there are large lagoons or backwaters, the resort of countless Waders; and there and on the inland lakes or tanks (as they are generally called) Ducks and Terns of various kinds are abundant in winter, and many other birds at all seasons. The avifauna of the northern half of the island is quite Indian in its character. The east and south-east parts also contain a good deal of wild country; they are thinly populated, and are visited the least by Europeans. One district is the home of the few remaining Veddahs, the supposed aborigines of Ceylon, who,

although almost savages compared with the rest of the natives, are said to retain the honourable distinction of high caste. The extreme south and south-west are generally well cultivated; and paddy-fields and cocoa-nut plantations are general in that part of the country.

The mountain-districts lie almost in the centre of the southern half of the island; and in this half, at various elevations ranging from sea-level to 8000 feet, are found by far the greater number of the peculiar Ceylon birds. A conspicuous feature of the Ceylon hills is the luxuriant vegetation which clothes them from their foot to the tops of the highest ranges; and although masses of rock may be seen here and there projecting from the mountain-sides, even these are largely covered with ferns and creeping plants. The mountain region may be divided ornithologically into the lower and upper hills. The country up to between 1500 and 1600 feet, the elevation of Kandy, is only partly cultivated; and its diversified character provides suitable habitats for a great variety of birds. This is particularly the case in the neighbourhood of Kandy, where there is some really wild jungle, in which some of the rarer hill species as well as low-country birds are found at certain seasons.

From the elevation of Kandy to about 5000 feet are the coffee-districts; and where this cultivation is general the number of birds is small, and they are found mostly at the higher and lower boundaries of the estates. If, however, the soil be unsuited for coffee and the jungle remain uncleared, birds are numerous, and many of the peculiar kinds, *Athene castaneonota*, *Palæornis calthropæ*, &c., may be met with. These lower hills are the great resort for the passerine immigrants; and birds of prey abound there. From 5000 to 8200 feet (the highest point in the island) constitutes what I shall have frequent occasion to speak of as the upper hills. They are almost entirely covered with tree jungle, with a dense undergrowth of "nilloo" (*Strobilanthes*), small straggling bamboo, tree ferns, and a variety of other plants. These hills are the great stronghold of the Sambur Deer; and Elephants and Leopards mount to their summits. Nuwara Eliya, the sanatorium of the island and a place where I have collected largely, is at an elevation of 6000 feet, and lies in a narrow plain, the houses being mostly scattered along the sides at the foot of the surrounding jungle-covered hills. The birds found in this locality and the neighbouring district are not numerous in species; but they are mostly of kinds peculiar to the island, and include *Chrysocolaptes stricklandi*, *Brachypteryx palliseri*, *Cissa ornata*, *Zosterops ceylonensis*, and several others, whose range does not generally extend far below the upper hills.

Migratory Birds.—The migration of birds within and into Ceylon is a subject about which there is still a great deal to be learnt; but, owing to the absence of observers, there is little reason to expect much trustworthy information will be gained for some time. The migrations take place at the changes of the monsoons. The S.W. monsoon blows steadily and for the most part strongly from April to October on the west side of the island. In October there is a lull for a few days between the two winds. It is the season for cyclones in the

Bay of Bengal; and then very often there is stormy weather on the Ceylon coast. At the first decided indication of the N.E. monsoon setting in, the true migratory birds begin to appear; they are generally first seen in the north and north-west of the island, and gradually extend over the western side and to the hills. At the same time there is a large influx of resident species to these parts of the country, which during this N.E. monsoon are less exposed to the violence of the wind than in the other season. There is no positive evidence whence these birds come; but I think there can be little doubt that it is from the eastern side and some parts of the central districts. Many of them are certainly found there during the S.W. monsoon; but no continuous observations have been made on the eastern side, and there is little known of what resident Ceylon species are to be met with there at any particular season. It being a great game country, Europeans who visit the eastern jungles devote their time more to sporting than to natural history. I may give an instance showing that there must be a good deal yet to be done in certain parts of the country. In February 1871 I obtained at Nuwara Eliya two specimens of a Flycatcher (*Erythrosterna hyperythra*) of which the type specimen in the Berlin Museum, obtained in 1866, was the only one known; it came from the Ceylon hills; but that species is certainly not found in the hill districts during a great part of the year, and yet it has not been observed elsewhere*. Towards the close of February the N.E. monsoon comes to an end, and is followed by five or six weeks of fine calm weather before the usually stormy burst of the S.W. monsoon. The migratory birds now take their departure, and many species resident in the island leave its western side. A Tern, however, in immature plumage and believed to be *Sterna gracilis* has only been observed on the Ceylon coast in summer; but as the Ceylon summer is at the same time as the Australian winter, the fact of this Tern being found at Colombo in July is an additional reason for believing it to be that Australian species. I have also only seen Frigate-birds during the summer; but Mr. Layard has recorded their occurrence in February.

With respect to the breeding-season for Ceylon birds it is difficult to fix any definite rule. The climate in the low country is always hot and damp, and birds of some species or other are nesting throughout the year. In many cases the breeding-time appears to depend on the monsoons; but I believe it often varies with the same species in different parts of the island. On the upper hills, where there is the nearest approach to a cold season of any part of Ceylon, and where the midday tropical heat is succeeded by cold nights and, in January and February, by severe frost, the breeding-season follows the rule in temperate climates and usually begins about April; in other parts of the country either nesting or moulting appears to be always going on.

From what I have said of the character of the country it will be evident that Ceylon possesses, in its swamps, jungles, forests, rivers, and coasts, the conditions suitable for the existence of a great variety

* See No. 127. footnote.

of birds; the waters on the coast and inland swarm with fishes; the country is alive with insects and reptiles; and vegetation is most luxuriant in its growth; food of all kinds abounds; and there is no winter in the low country. It is no wonder, therefore, that species and individuals are numerous; but although I have, I believe, been able to add something to the good work done by Mr. Layard, the subject is yet far from being exhausted, and much remains to be done in examining the eastern side of the island generally, in discriminating many of the wading birds, and in working out the Terns and other birds found on the coast.

In this Catalogue I have followed Jerdon's arrangement of the species as given in his 'Birds of India,' and have adopted the names he uses, except in a few cases where older titles may be more properly employed.

1. FALCO PEREGRINUS, Gmelin.

Europe, Asia.

2. FALCO PEREGRINATOR, Sund.

Ceylon, India, W. Asia.

3. HYPOTRIORCHIS CHICQUERA, Daud.

Ceylon, India.

These species are recorded by Layard as found in Ceylon; but they have not come under my notice.

3 *bis*. HYPOTRIORCHIS SEVERUS, Horsf.

In a collection of birds sent home by Mr. S. Bligh, and consisting entirely of hill species shot by himself in one of the coffee-districts, is an undoubted specimen of the Indian Hobby, an unexpected addition to the list of Ceylon birds. It was killed whilst hawking after dragonflies.

Ceylon, N. India, Malacca, Java, Philippines.

4. TINNUNCULUS ALAUDARIUS, Gmel.

The Kestrel is widely distributed in Ceylon; I have seen it, however, most frequently in the northern part of the island, and a pair of these birds for many weeks frequented a small clump of cocoa-nut palms near my house at Aripo. I have also observed it at Nuwara Eliya during winter; and it is often met with in the coffee-districts. Although probably a migrant, it certainly spends several months in Ceylon.

Europe, Asia.

5. ASTUR TRIVIRGATUS, Temm.

This is a hill species, and not very uncommon. I have examined specimens of the bird in Ceylon, and have now before me a very good one killed by Mr. Forbes Laurie.

Mountains in Ceylon and India.

6. MICRONISUS BADIUS, Gmelin.

Said by Layard to be very common and widely distributed in Ceylon. I have identified several specimens of it.
Ceylon, India, Burmah, Malaya, Hainan.

7. ACCIPITER VIRGATUS, Temm.

I have a specimen of this Sparrow-Hawk from the lower hills. Layard does not mention this species; but it may possibly have been the one recorded by Kelaart as *A. nisus*, which I have no reason to think has been found in Ceylon.
Bill dark bluish; irides yellow; feet yellow.
Ceylon, India, Burmah, Malaya, Formosa.

8. AQUILA PENNATA, Gmelin.

Recorded by Layard.
Ceylon, India, W. Asia, N. Africa, S. Europe.

9. NEOPUS MALAIENSIS, Reinw.

Tolerably numerous in the hill country, and well known in the coffee-districts. I have seen several skins in different states of plumage, which were obtained from the hills around Kandy.
Ceylon, India, Burmah, Malaya.

10. NISAËTUS BONELLI, Temm.

Recorded by Layard as having been obtained by the late Dr. Templeton, R.A.
Ceylon, India.

11. LIMNAËTUS CRISTATELLUS, Temm.

This noble bird, mentioned by Layard under the name of *Spizaëtus limnaëtus*, Horsf., is well known in the hill country, and not unfrequently visits the poultry-yards of the coffee-planters. I have seen it on many occasions at Nuwara Eliya, and listened to its squealing cry as it soared in wide circles over the plain. In the beginning of 1871 I procured a fine living specimen, and shipped it at Colombo for the Society's Gardens; but it died soon after the vessel sailed. The feet and claws in this species are very powerful.
Mountainous parts of Ceylon and India.

12. LIMNAËTUS NIPALENSIS, Hodgson.

Recorded by Layard as having been procured by the late Dr. Kelaart on the hills, at an elevation of 4000 feet. It is remarkable that this species should be found in Ceylon, as in India it is only known from the northern hills; but Mr. Blyth tells me that he identified Dr. Kelaart's specimen, and has no doubt of its being the true *L. nipalensis*, Hodgs. No other example of this bird has been recognized in Ceylon.
Ceylon, N. Indian hills, Formosa, Japan.

13. Spilornis bacha, Daudin.

Generally distributed over the island, frequenting trees on the margin of tanks and marshy places in the low country, and near open grass-land among forest-jungle on the hills. One specimen, which I shot near Aripo, disgorged a Tree-snake (*Passerita*) more than 3 feet long and nearly uninjured. Another, obtained at Nuwara Eliya, fell to the shot as if mortally wounded, although only slightly injured in one wing; it soon recovered, and became sufficiently tame to feed from my hand. I was fortunately enabled to bring the bird with me to England; and it is now alive in the Society's Gardens.

S. spilogaster, Blyth, from Ceylon, is now recognized as the immature condition of *S. bacha*; and there is no doubt that the *Hæmatornis cheela*, recorded by Layard as common in Ceylon, may also be referred to the same species.

Bill dusky; irides golden yellow; cere, legs, and feet dull yellow.

Ceylon, S. India, Andamans, Malaya.

14. Pandion haliaëtus, Linn.

Rare in Ceylon, and I have only seen it on one occasion; it was perched on a buoy in Galle Harbour; and I was able to watch it from a short distance for a considerable time. Lord Walden has two specimens of it from Ceylon.

Europe, Asia, Africa.

15. Polioaëtus ichthyaëtus, Horsf.

This Eagle I have only seen in the north of the island, where it is not uncommon near the coast. I shot an immature specimen at Aripo in November 1866. The irides were brown, but Jerdon states (App. B. of Ind. iii. p. 869) that in the adult bird they are pale yellow.

Bill black; "irides pale yellow;" feet yellowish white.

Ceylon, India, Burmah, Malaya.

16. Haliaëtus (Cuncuma) leucogaster, Gmelin.

This is the common Sea-Eagle of Ceylon, and is probably found all round the island, although I do not remember having observed it at the extreme south. It may occasionally be seen soaring over Colombo Harbour and the adjoining lake; but further north, in the neighbourhood of Aripo and Mannar, several pairs of these noble birds may generally be found, each generally in its own district, and rarely wandering far away. In the strait separating the island of Mannar, at the east end of Adam's Bridge, from the mainland of Ceylon, the narrow channel for the passage of boats in the midst of the expanse of shallow water around is marked here and there with stakes; and on these may generally be seen perched one or two pairs of this Eagle, and sometimes a pair of *Polioaëtus ichthyaëtus*. As the receding tide lays bare the extensive banks of soft mud on each side the Eagles keep a sharp look-out for the crabs, which are abundant just at the edge of the water, and, pouncing on their prey, sail

off to some favourite tree, where the hard shell of the crab is broken up and the animal devoured. One of these stations, further down the coast, was on the cross-trees of a government flagstaff at Aripo; and the ground below was always littered with crab-shells and fish-bones, the remains of many a meal provided from the refuse of the fishermen's nets, which were hauled in on the beach close by. Sea-snakes (*Hydrophis*) are said to be a favourite food of this species; and these reptiles are abundant on the Pearl-Oyster banks nine or ten miles off the Aripo coast; but I have never observed the Eagles so far from the land.

A curious instance came to my knowledge of this bird having apparently thriven on most unnatural food. My friend, Dr. Boake, the late Principal of Queen's College, Colombo, once pointed out to me an example of this Eagle of full size, but in immature plumage. It had been recently brought to him by a native, who said he had reared the bird in his own hut. In answer to an inquiry as to what he had fed the bird on, he said "rice and curry." This is the universal food of the natives; and dogs and cats appear to thrive as well upon it; but that a Sea-Eagle should have been reared on such food seemed incredible. However, the matter was soon tested by a supply of rice and curry being given to the bird; and the statement of the native was quickly confirmed by the rapid disappearance of the whole of the food. The next day some fish was given, and the Eagle, once having tasted it, could never afterwards be induced to touch rice and curry.

In a male example of this Sea-Eagle which I shot at Aripo I found the liver of an enormous size, covering the whole of the pectoral and a great part of the abdominal regions.

Bill dusky blue; cere yellow; irides brown; feet yellowish white.

Ceylon, India, Burmah, Malaya, Australia.

16 *bis*. BUTEO DESERTORUM, Daudin.

Lord Walden has received a single specimen of this Buzzard from Ceylon.

Ceylon, India, Persia, S. Europe, Africa.

17. CIRCUS SWAINSONII, A. Smith.

Common in the Aripo district throughout the year; and I have frequently seen it at Nuwara Eliya in July and August. The pale rump of the brown birds attracts attention as they hunt backwards and forwards over the open country.

Bill black; irides yellow; feet yellow.

Asia, Africa.

18. CIRCUS CINERACEUS, Montagu.

I have only identified this species on one occasion; it was killed near Colombo. Although probably not uncommon in Ceylon, it is certainly not so numerous there as the last species.

Bill black; irides yellow; feet yellow.

Europe, Asia, Africa.

19. Circus melanoleucos, Forster.

This species was first described from, and has since been identified as a visitor to Ceylon; but I have never met with it. Layard procured it on the west coast.

Ceylon, India, Tientsin.

20. Circus æruginosus, Linn.

This Harrier is probably only an occasional visitor to Ceylon. I observed a pair of these birds near Aripo in January 1870; and after several ineffectual attempts to get near them, I at last succeeded in shooting the female, a handsome specimen, with grey wings and tail. Layard does not appear to have met with this species; but it is included doubtfully in the list of birds in Tennent's 'Natural History of Ceylon.'

Bill black; irides and cere yellow; feet deep yellow.

Europe, Asia.

21. Haliastur indus, Bodd.

Common on the coast, especially on the northern half of the island. Specimens in various states of plumage were obtained at Aripo. I have also seen it at Colombo and Trincomalie.

Ceylon, India, Borneo.

22. Milvus govinda, Sykes.

This bird has very much the same habits and distribution in Ceylon as the last species. Neither of them, however, frequents the towns so much as they both do in India. In early morning at Aripo I have seen a flock of fifty or sixty Pariah Kites, in company with about a dozen of the other species, eagerly clutching at and feeding on the winged Termites which were rising in a cloud from an ant-hill not far from my house. The Crows were busily engaged on the same work, but kept at a respectful distance, apparently not liking to join in the general scramble going on among their more powerful neighbours, the Kites.

Ceylon, India, Burmah, Malaya, Andamans, China, Formosa, Hainan.

Note.—There are two, perhaps three, closely allied species of Kite found in India, the smallest of which, Mr. Gurney tells me, is identical with *M. affinis* of Australia; and there is some doubt as to which is best entitled to the specific name of *govinda*. As it is not quite clear to which of these the Ceylon birds belong, the above geographical range may not be strictly correct.

23. Pernis ptilorhynchus, Temm.

Given by Jerdon as *P. cristata*, Cuvier. I had an opportunity of seeing this bird alive in Ceylon; and Mr. Forbes Laurie has recently shown me a good specimen which he shot on the hills. Lord Walden has also received examples of it from Ceylon. Mr. Laurie's specimen agrees pretty closely in dimensions with those given by

Jerdon; but Mr. Gurney tells me that the birds from Ceylon are usually larger than those from India. Although this bird is well known from Ceylon, it appears not to have been hitherto recorded from that island.

Ceylon, India, Burmah to Malaya.

24. BAZA LOPHOTES, Cuv.

Not very numerous, but has been found both in the low country and on the hills. I have seen specimens from the Kandy district.

Ceylon, India.

25. ELANUS MELANOPTERUS, Daud.

I have only seen specimens of this handsome bird from the hills, where locally it is not uncommon. Layard obtained it in the low country.

Ceylon, India, part of Africa, S. Europe.

26. STRIX INDICA, Blyth.

Formerly included in *S. javanica*, De Wurmb., which Jerdon has recently (Ibis, 1871) stated to be more nearly allied to *S. candida*, Tickell. *S. indica* is very local in Ceylon, and is entirely confined to the north of the island. Layard gave the fort of Jaffna as the only locality for it; but I have since obtained it at Aripo, where a pair of these Owls were resident. They frequented a government storehouse in my compound, each regularly perching in a dark corner under the roof, at opposite ends of the long building, and apparently living in harmony with the hundreds of Bats which hung from the roof and walls around. I have never observed these birds out of doors until some time after sunset.

Bill horny yellow; irides black; feet yellowish brown.

Ceylon, India.

27. SYRNIUM INDRANEE, Sykes.

This bird is found in the low country in the northern half of the island and on the lower hills; but although well known to and dreaded by the natives as a bird of ill omen, it does not appear to be anywhere numerous. Doubts have been expressed as to whether the so-called "Devil-bird" is really an Owl; but I have frequently questioned the native hunters about the bird, which is so notorious in Ceylon for its horrible cries; and they have described it in such terms as to leave no doubt in my mind about its being an Owl, and probably of this species.

I have only seen specimens of it from the Kandy district; but it has been found in several parts of the island, and I once had an opportunity of hearing the bird under very favourable circumstances near Aripo. I was lying out in wild jungle about eight miles from my house, and five from the nearest native village, watching for Bears. It was bright moonlight; the Nightjars had long ceased their churring notes, and there was an almost unnatural stillness around—the midnight silence of the jungle, only occasionally broken

by the distant roar of the surf. For several hours I had been watching the small drinking-hole in front of me; and it was now time for the Bears to come if they meant to visit the pool at all that night. I was eagerly scrutinizing the openings among the bushes, when piercing cries and convulsive screams suddenly issued from a small patch of bushy jungle about thirty yards on the left of my hiding-place. My hunter at first thought a Leopard was there, and told me to keep quiet; but the cries increased, and became so horribly agonizing, that it was difficult to believe murder was not being committed; so, jumping up with my double rifle in my hand, I ran cautiously down to the patch of jungle, my trusty servant following with a second gun. Before I reached the place all was as silent as before, and the idea of the Devil-bird flashed across my mind. This was afterwards confirmed by the hunter, who, however, did not apparently care to talk much about it. A careful examination of the sandy ground among and around the bushes when daylight appeared resulted in no evidence of any tracks of Leopards or recent traces of other quadrupeds. I have no doubt, therefore, that it was this dreaded Owl which had disturbed our night watch; and although my sport was spoilt for the night, I did not regret having heard for once the really appalling cries of this ill-omened bird. The dimensions of a Ceylon specimen are:—Length 20 inches, wing 13, tarsus 2.

Ceylon, S. India, Malacca, Formosa (*Swinhoe*).

28. Huhua pectoralis, Jerdon.

Some three or four years ago, whilst I was in Ceylon, Mr. Samuel Bligh brought to me for identification some specimens of a Horned Owl, which appeared to us, after examination, to be identical with *Huhua nipalensis*, Hodgson, except in being smaller, but agreeing in that respect with the measurements of a bird from S. India described by Jerdon as *H. pectoralis*. Considerable confusion has existed between *H. nipalensis*, Hodgs., from Nepal, *H. pectoralis*, Jerdon, from S. India, and *H. orientalis*, Horsfield, from Java; and the subject is referred to by Jerdon (B. of Ind. vol. i. p. 132) as a matter on which "materials are wanting to form a just conclusion." Jerdon has since (Ibis, 1871, p. 346) stated his opinion that the Nepal species will stand, and has united the other two under *H. orientalis*—but, I understand, in the absence of a specimen from S. India for direct comparison.

A comparison of one of the Ceylon birds with specimens of true *H. orientalis* and *H. nipalensis* in the British Museum has satisfactorily shown, however, that they are three very distinct species, and that the Ceylon bird is very probably the same as *H. pectoralis* from S. India. In this conclusion I am supported by Mr. Gurney and Lord Walden.

H. pectoralis may be described as like *H. nipalensis*, but very much smaller, both of them wanting the *closely* barred plumage of *H. orientalis*. It is, I think, evident from Jerdon's measurements of *H. nipalensis* that they were taken from a Malabar specimen of

what was supposed to be that species; but he says in his description, the brown bars of the under parts "in some tending to coalesce and form a pectoral band." In his figure of *H. pectoralis* in the 'Madras Journal' great prominence is given to this band; but in the Ceylon bird it is not very distinct; and, as Mr. Gurney has pointed out to me, this difference appears to be owing to the light intervals between the dark transverse bars on the pectoral feathers being not so light in the plate as in the Ceylon bird*. The following are the comparative measurements of the three species:—

	Length. in.	Wing. in.	Tarsus. in.
H. nipalensis, from Nepal (B.M.) ..	28–29	18·5	2·5
H. pectoralis, from Ceylon	22	16	2
H. orientalis, from Java (B.M.)	20	12	1·5

H. pectoralis is not uncommon on the lower Ceylon hills, and has probably been mistaken, without much critical examination, for the common *Ketupa ceylonensis*.

Bill yellow; irides brown; feet dull yellow.

Ceylon, S. India.

29. KETUPA CEYLONENSIS, Gmel.

Generally distributed over Ceylon, but perhaps more common in the low country than on the hills. I have frequently met with them near Aripo. Large trees overhanging a tank are a favourite resort of these birds, and I have often found them in the early morning perched day after day on the same branch. They are frequently captured and kept alive by the natives.

Bill dusky yellow; irides yellow; feet dirty yellow.

Ceylon, India, Burmah, China; Palestine (*Tristram*).

30. EPHIALTES BAKKAMUNA, Forster.

Some difficulty exists in determining how many species of small Tufted Owl are found in Ceylon, partly on account of the confusion there has been among the species or races found in India, and variously named by different naturalists, and partly because there is some doubt about the correctness of Dr. Kelaart's identification of the species he records. There is, I think, no question, however, that the very common and widely distributed species is that given by Jerdon as *Ephialtes lempigi*, Horsf., but described from Ceylon in 1781 by Forster as *Strix bakkamuna*, an unfortunate name, as it is evidently meant for "bakha muna"—lit. "Fish-Owl," and the Singhalese name for *Ketupa ceylonensis*. Forster's plate, however, shows that his bird was the common *Ephialtes*.

E. bakkamuna is very common in most parts of the low country, and is also found about Kandy and on the lower hills. It was a

* Since the above was written Mr. Bligh has sent home a specimen of this Owl for the Norwich Museum. It is generally rather darker, and probably more mature than the one in my possession; and the pectoral band is very distinct, leaving no doubt of the validity of Jerdon's species.

constant evening visitor to the trees surrounding my house at Aripo; and its single call of *whock*, repeated at short and regular intervals, was frequently to be heard far into the night. It is a bird of rapid flight. A young bird of this species was completely tamed by Mr. Bligh in Ceylon; it would fly to his finger, and delighted in being stroked and played with; and this tameness continued undiminished after the bird had become adult. I have often had this amusing little pet in my hands.

The dimensions of a Ceylon specimen, a female, are:—Length 8 in., wing 6·5, tarsus 1·4, tail 3.

Bill dusky; irides yellow; feet greyish.

31. Ephialtes sunia, Hodgson.

Kelaart mentions, under this name, "a very small reddish-yellow Eared Owl, occasionally seen in the very highest parts of the island." I have some recollection of seeing a specimen from the hills, which I believe was the bird he referred to, and I think the species may be included in the Ceylon list. It is probably the rufous phase of *E. pennatus*, Hodgs.

I have no evidence of any other species of *Ephialtes* in Ceylon than the two I have here given.

32. Athene castaneonota, Blyth.

Peculiar to Ceylon. It is probably confined to the southern half of the island, and has been killed on the hills and in the low country, but is by no means common. I obtained two specimens that were killed in the neighbourhood of Kandy. It is admitted as distinct from *A. castanoptera* from Malaya.

Bill yellow; irides ——?; feet greenish brown.

Ceylon.

33. Ninox hirsuta, Temm.

Rare in Ceylon; I have only seen one specimen, which was obtained in the central district. Layard also only met with it once in the course of eight years.

Bill green; irides yellow; feet dingy yellow.

Ceylon, India, Borneo, China, Japan.

34. Hirundo rustica, Linn.

Referred to by Layard under *H. gutturalis*, Scop., the Indian representative of the European species; but the grounds for separating them appear to be of the slightest description, and I shall adopt the now general opinion that they are the same. This bird is a winter visitor to Ceylon, and generally distributed, but especially abundant in the low country. Most of these birds are young ones, without the long tail-feathers.

Asia, Africa, Europe.

35. Hirundo domicola, Jerdon.

Confined to the upper hills in Ceylon. It is a very familiar bird,

commonly nesting in the verandas at Nuwara Eliya and in the district.

Ceylon, Neilgherries, Malaya.

36. ? Hirundo daurica, Linn.

Layard records having obtained a single specimen at Point Pedro. It is more probable, however, that this bird was *H. erythropygia*, Sykes, the S. Indian species, which had not at that time been distinguished from *H. daurica*, a northern bird and having a wide range to the eastward. They both have the under plumage streaked.

Ceylon, S. India.

37. Hirundo hyperythra, Layard.

This Swallow was discovered by Layard in 1849, and until recently was considered peculiar to Ceylon; but I have seen a specimen lately received by Lord Walden from Malacca, and it has been otherwise recorded from that country. It is abundant in the central and, at times, in the western and southern districts of the island, both in the low country and on the lower hills; but I have not observed it at Nuwara Eliya or in the north. Its distinguishing character consists in the whole of the underparts being deep chestnut.

Bill black; irides brown; feet black.

Ceylon, Malacca.

38. Acanthylis gigantea, Temm.

This bird is said to be well known at Nuwara Eliya; and Layard mentions hearing of the native report that it breeds in hollow rhododendron trees; but there is probably some mistake, as I could hardly have failed to notice the bird under such circumstances. I have only seen it from the coffee-districts; and although specimens have undoubtedly been obtained at Nuwara Eliya, I expect it will be found to be only an occasional visitor there.

Ceylon, S. India, parts of Malaya.

39. Cypselus melba, Linn.

Probably a winter visitor to Ceylon. It is found in some abundance on the hills at that season, but is rather local in its distribution. I have seen it at Nuwara Eliya in the cold season; and it remains there several months, particularly frequenting some precipitous cliffs overlooking the plain on which the little town is built. In the afternoon fifty or sixty of these birds might any day be seen on the wing dashing past the hill-sides in pursuit of insects, or sweeping in wider circles at a considerable elevation.

Hill-regions in Ceylon, India, W. Asia, Africa, Europe.

40. Cypselus affinis, Gray.

Layard speaks of this bird as migratory, and breeding in April in large numbers about the rocks at Damboul. I have also found it nesting, but in August, under the rocks overhanging the entrance to the famous temple at Damboul; and as it breeds in Ceylon during

the summer months, I have no doubt it is a resident species. It has been met with in other parts of the island, but is local. I have not observed it on the upper hills.

Ceylon, India.

41. CYPSELUS BATASSIENSIS, Gray.

Very common in the low country and particularly abundant in the north, where the palmyra is the common palm, on which it builds its nest. I have not observed this bird at Nuwara Eliya, but have known the following species sometimes mistaken for it there.

Bill black; irides brown; feet brownish.

Ceylon, India, Assam, Burmah.

42. COLLOCALIA FUCIPHAGA, Thunberg (1772).

There are several localities in Ceylon in which this little Swift has been known to breed; and Layard has given a good description of one which he visited. These breeding-stations are at various elevations, from close to the sea to the highest hills. Kelaart states that he has "heard from very good authority that some years ago baskets of the edible nests were obtained from a cave on the Pedrotallagalla hill. Very nutritious soup was made of them for the invalids who at that time resided at Nuwara Eliya." This hill is the highest (8200) in Ceylon and overlooks the still all-important sanatorium; but I could not ascertain the situation of the cave. The birds, however, are numerous at Nuwara Eliya in winter; and I have obtained specimens there, as well as in the low country between Colombo and Kandy.

Bill black; irides dark brown; feet purple-brown.

Ceylon, N. and S. India, Assam, Malay islands.

43. DENDROCHELIDON CORONATUS, Tickell.

Layard says this species is generally distributed; but I have only seen it between Colombo and Kandy and in the south. I shot a pair of these birds near Colombo at the end of May, and have seen it in abundance in Kandy itself in March. I think there is little doubt that it is a resident, although perhaps migrating from one part of the island to another. I have neither seen nor heard of it at Aripo or Nuwara Eliya.

Bill black; irides dark brown; feet bluish black.

Ceylon, S. and Central India, Pegu.

44. BATRACHOSTOMUS MONILIGER, Blyth.

I have only seen one skin of this curious bird. It was procured by Mr. H. Nevill close to Amblangodde Lake, a few miles north of Galle. I was shown the spot where it was killed—a small piece of recently cleared land nearly surrounded by rather low jungle. The species has been but rarely met with, and, so far as is known, is confined to the south-west of the island, in the country lying between Adam's Peak and Galle.

Mr. Blyth tells me that Jerdon's description of this species was

taken from a Ceylon specimen, but that the one from S. India is probably the same.

Ceylon, S. India?

45. CAPRIMULGUS KELAARTI, Blyth.

This species, first discovered in Ceylon, is entirely confined to the hills, ranging from about 2000 feet upwards, and common in the Nuwara Eliya district. It is very noisy during March and April, at the commencement of the breeding-season, appearing with great regularity a few minutes after sunset from its accustomed hiding-place in the thick jungle. I have reason to think this Nightjar leaves the upper hills during the cold season and descends to a more temperate climate.

Bill dusky; irides dark brown; feet fleshy brown.

Ceylon, Nellgherries.

46. CAPRIMULGUS ATRIPENNIS, Jerdon.

Tolerably common near Colombo and in the south; I have also obtained it in the interior, about twenty miles from Trincomalie. It is, I believe, a low-country bird; and I have not met with it above the foot of the hills.

The specific distinctness of this Nightjar was hardly ascertained when Layard published his "Notes on the Ornithology of Ceylon;" and when he speaks of so rare and remarkably coloured a species as *C. mahrattensis*, Sykes, being "abundant in the vicinity of Colombo and throughout the southern province," and that bird has not been met with in Ceylon by any subsequent collector, it is not unreasonable to conclude that the species intended is that which I have since identified as *C. atripennis* from the same localities.

Bill dusky; irides brown; feet pale brown.

Ceylon, S. India.

47. CAPRIMULGUS ASIATICUS, Latham.

Common in the low country, especially in the northern half of the island, where it is resident. I have found it breeding in September at Aripo, its two eggs being deposited on a bare sandy spot under the shelter of a bush. At Colombo it is numerous in the cinnamon-gardens during at least part of the year, hiding during the day at the foot of the bushes; but I have no recollection of seeing this bird in the south of the island. Ceylon specimens are very grey compared with those from India, a good series of the latter which I have examined having all a conspicuous rufous tinge on the upper surface. This is only observable in Ceylon birds in young specimens. There is another point in connexion with this species to which I wish to direct attention; and it may be desirable to extend it to other species of Caprimulgidæ. Jerdon and other authors have been accustomed to group the species of *Caprimulgi* in accordance with the number of tail-feathers which have a white terminal spot, this spot being supposed to be found only in the male. I need hardly say that it is only too common for collectors to omit any notice of the sex of the birds

they shoot; and this frequent omission has no doubt led to the overlooking of the fact that in *C. asiaticus* the female has the white tail-spot as well as the male, although about one fourth shorter. This is not a peculiarity of birds from Ceylon, as in a series of Indian specimens of unknown sex in Lord Walden's collection I was able to separate them at once into two groups agreeing on this point precisely with the known sexes of the birds of my own collecting. I first noticed the presence of the spot in the female in a specimen I shot at Aripo in 1866, and I made a note of it; but the skin was destroyed by rats; I have since obtained two more examples showing precisely the same character, so that the first could not have been an accidental variation. I have not been able to ascertain whether the same character is found in the two other Ceylon species, as all my specimens of them are males.

Bill dusky, tip darker; irides very dark; feet brownish flesh.
Ceylon, India, Burmah.

48. HARPACTES FASCIATUS, Forster.

Only found among wild tree-jungle in the southern half of the island. I have seen it about twelve miles from Colombo, in a wild uncultivated district in the low country, and also at Nuwara Eliya, in February; but it is not very commonly met with, and is perhaps somewhat local in its distribution. In its manners it resembles the Flycatchers, and has generally a peculiar fluttering mode of flight.

Bill dark blue; cere smalt; irides brown; feet lavender.
Ceylon, South and Central India.

49. MEROPS VIRIDIS, Linn.

Exceedingly abundant in the northern part of Ceylon, where it is a resident. It is also found sometimes at Colombo and on other parts of the coast. Whilst living at Aripo I had constant opportunities of observing these birds closely, as the railings of my veranda were a favourite perching-place for them, and they would allow me to approach within a few feet without showing any alarm. Forty or fifty of these beautiful birds generally roosted in a small bushy tree only a few yards from the house. This species seems to prefer a low station when looking out for its prey, frequently perching on a small stick only a few inches from the ground. The Ceylon birds generally have the blue throat which is found in the variety described as *M. torquatus* by Hodgson.

Bill black; irides blood-red; feet lead-colour.
Ceylon, India to China.

50. MEROPS PHILIPPINUS, Linn.

A migratory bird; generally distributed over the low country, but, like the preceding species, very numerous in the north. I have first observed it at Aripo at the end of September; and it remains there till the change of the monsoon in April. It is a noisy bird, with a lofty, dashing flight, successfully pursuing the dragonflies, and then

sailing back on outstretched wings to its favourite station on the dead branch of some neighbouring tree, where the insect is killed and swallowed. In the early mornings of March, when there has been but little wind stirring, and the sea was as smooth as glass, I have frequently observed these Bee-eaters hunting for insects close to the surface, and a quarter of a mile from the shore. I have noticed this bird frequently at Colombo, but only in small parties. At Aripo I have often seen sixty or seventy on the same tree; in fact, during its stay in Ceylon, it is more numerous there than the resident species.

Bill black; irides blood-red; feet lead-colour.

Ceylon, India, Burmah, Malaya.

51. MEROPS QUINTICOLOR, Vieill.

This is a hill-species, and a resident in Ceylon. I have shot it in August at the foot of the hills in the south, and I have frequently seen it on the lower hills in the neighbourhood of Kandy; but it is nowhere so numerous as either of the preceding species, and is generally seen singly or in pairs. I have not observed it on the upper hills. Of two Ceylon specimens, with the chestnut border to the black throat-band, one has the tail entirely green, and the other with the central feathers blue.

Bill black; irides blood-red; feet lead-colour.

Ceylon, India, Burmah.

52. CORACIAS INDICA, Linn.

This bird, although undoubtedly locally common in the north of Ceylon, has never come under my notice in the jungly district of Aripo; nor have I seen it in the south of the island. In the country between Colombo and Kandy, however, I have frequently met with it; and its often noticed habit of perching on the top of a bare pole or the stem of a dead tree is also characteristic of the bird in Ceylon. Its flight is regular and crow-like; but when perched its head is sunk on its shoulders, giving the bird a remarkably clumsy appearance, as is also the case with the Bee-eaters when not on the wing.

Bill blackish; irides dark brown; feet fleshy yellow.

Ceylon and the greater part of India.

53. EURYSTOMUS ORIENTALIS, Linn.

Layard met with three examples of this bird; but it has never come under my notice.

Ceylon, northern half of India, Burmah, Malaya, China.

54. PELARGOPSIS GURIAL, Pearson.

The synonymy of this bird has been much confused. It is mentioned by Layard under the name of *Halcyon capensis*, Linn., and is described by Jerdon under the heading of *H. leucocephala*, Gmel. Mr. R. B. Sharpe (P. Z. S. 1870), however, has worked out the

question of identity, and has restored to it Pearson's original name of *gurial* (1841), by which it should be known.

I have seen skins of this species, but have not met with the bird alive. Layard speaks of its frequent occurrence on the east side of Ceylon, and also of its being found about Caltura, on the west coast. The latter locality is, I have heard, a good one for this bird; and I have reason to think it is also sometimes met with on the lower hills.

Bill red; irides brown; feet dull red.

Ceylon, India eastward.

55. HALCYON SMYRNENSIS, Linn.

H. fusca, Bodd., is now admitted as identical with the old Linnean *H. smyrnensis*. In Ceylon this Kingfisher is abundant in the low country wherever there is water, frequenting alike the neighbourhood of paddy-fields and the banks of rivers. It is perhaps less numerous in the north than elsewhere, but it was not uncommon at Aripo. Ceylonese specimens are generally more brightly coloured than those from other countries.

Bill deep red; irides brown; feet vermilion.

Ceylon, India to China, Asia Minor.

56. HALCYON PILEATA, Bodd.

Recorded by Layard, under *H. atricapilla*, Gmel., as having been killed by him in the north of the island. It appears to be an eastern species, and rare both in India and Ceylon.

Ceylon, India, Burmah, Malaya, China.

57. CEYX TRIDACTYLUS, Pall.

Widely distributed in Ceylon, but nowhere common, and only to be procured with difficulty. I have never seen the bird alive, but at various times obtained three specimens, which were killed in the central district.

Bill coral-red; irides brown; feet red.

Ceylon, India, Malaya.

58. ALCEDO BENGALENSIS, Gmel.

Common everywhere in Ceylon. It is always to be found at Nuwara Eliya, as well as in all parts of the low country.

Bill reddish, with the upper part dusky; irides brown; feet coral-red.

Ceylon, India to China, Malaya.

59. CERYLE RUDIS, Linn.

This is a common species, frequenting rivers more than tanks or paddy-fields. I have frequently met with it at Aripo; and it is particularly abundant on the southern rivers.

Bill black; irides brown; feet brown.

Ceylon, India to S. China, Malaya, W. Asia, S. Europe, Africa.

60. Hydrocissa coronata, Bodd.

Confined to wild forest jungle in the central and northern parts of the island. I have seen it occasionally a few miles from Aripo; and whilst travelling through an extensive tract of forest on the road between Kandy and Trincomalie, small parties of these birds were frequently observed on the tops of the trees, or slowly sailing across the road from one part of the forest to the other. In the early mornings their harsh cries mingled discordantly with the howlings of Monkeys (*Presbytes*), the call of the Jungle-fowl, and the more musical notes of the Long-tailed Robin (*Kittacincla*), almost the only sounds to be heard in this primitive jungle, far from the borders of cultivation, and only disturbed by occasional travellers or the bell of the light-stepping postal runner.

Ceylon, S. India.

61. Tockus gingalensis, Shaw.

Considerable confusion has existed between this species and *T. griseus*, Latham; and it is desirable to mention that the species properly known as *T. gingalensis* is only found in Ceylon. Under the above heading Jerdon has inadvertently spoken of both in his 'Birds of India,' but he has since corrected the mistake (Ibis, 1872, p. 5).

Tockus gingalensis is, according to Layard, not uncommon in certain districts; and Lord Walden has received several specimens of it. It keeps, I believe, mostly to the forests; and I have only once obtained it at Aripo, where its harsh cry betrayed its presence on a low tree close to my house. The colour and shape of the bill in this bird vary a good deal with age.

Bill yellowish, more or less marked with black; irides reddish brown; feet slate grey.

Ceylon.

Tockus griseus, Lath., is said by Jerdon to be also found in Ceylon; but I cannot hear of any well authenticated specimens.

62. Palæornis alexandri, Linn.

Bill red; irides buff; feet slate.

Ceylon, India, N. Burmah.

63. Palæornis torquatus, Bodd.

Bill red; irides buff; feet slate.

Ceylon, India, W. Asia, Tropical Africa?

These two species are exceedingly abundant in the north of Ceylon; but I have not seen them on the hills or in the south.

64. Palæornis rosa, Bodd.

I have only met with this species in the southern parts of Ceylon, where it is very destructive to the grain crops; but it is also found at times on the lower hills generally. I have seen a flock of fifty of these birds fly down one after another to a field of paddy; and each biting off a ear of the green corn, return to a neighbouring tree to

devour the plunder; and this has been repeated again and again. The above three species are constantly caged by the natives; and few native dwellings are without one or other of these favourite pets.

Bill yellow above, black below; irides buff; feet greyish.

Ceylon, India.

Note.—There is some doubt about the further range of this species, a closely allied form, with yellow under wing-coverts, having probably been confounded with it.

65. PALÆORNIS CALTHROPÆ, Layard.

Peculiar to Ceylon. It was first obtained by Layard at Kandy, where it is frequently numerous; and it is said to be generally distributed over the hills. Although recorded by Kelaart from Nuwara Eliya, I suspect this beautiful bird is only a rare visitor to that cool region, as I have never seen a Parrot of any kind at that elevation, and I have always been on the look-out for this species in particular. The colouring in the sexes is alike, except that in the female the green on the side of the head is less distinct, and the bill is black instead of red.

Bill, ♂ red, ♀ black; irides buff; feet slate.

Ceylon.

Note.—As some confusion has existed with regard to the correct spelling of the specific name of this species, I may mention, on the direct authority of Mr. Layard, that it was given from "Calthrop," a family name.

66. LORICULUS INDICUS, Gmel.

Peculiar to Ceylon. The history of this species has been fully discussed in a paper by Lord Walden (Ibis, 1867, p. 467), from which it appears that, although Edwards first figured and described the bird, it should stand as *L. indicus*, Gmel., according to the rules of zoological nomenclature. The name is unfortunate, as it is certain that the species is not found out of Ceylon; but it was not known by the earlier writers from what part of the Dutch settlements the bird described by Edwards was obtained.

This little bird is common in many parts of the southern half of Ceylon, and particularly quite in the south. It frequents cultivated ground and large native gardens; and I have sometimes seen it on the cocoanut-trees busily biting off and apparently eating the chip-like flowers. I believe it is confined to the low country. It is often caged by the natives, and, like allied species, sleeps suspended from the top of its cage by its strong curved claws. There is little difference in the colouring of the sexes; but individuals vary a good deal in the extent and brilliancy of the golden gloss on the back.

Bill reddish orange above, orange below; irides white; feet dull yellow.

Ceylon.

67. PICUS MAHRATTENSIS, Latham.

Common in the Aripo district, and, so far as I know, only found

in the north of Ceylon. It appears to frequent low jungle, and I have rarely seen it except on dead wood near the ground and old fences. It is a resident species.

Bill slate; irides dull red; feet lead-colour.

Ceylon, India.

Picus macei, Vieill., has been recorded by Dr. Kelaart as being found in Ceylon; but I think its occurrence is very doubtful, in which opinion I am strongly confirmed by Mr. Blyth.

68. YUNGIPICUS GYMNOPHTHALMOS, Blyth.

This little Woodpecker was discovered in Ceylon by Layard, and it is said to have been since found in S. India. It frequents the upper branches of large trees, and, although generally running over the bark in true Woodpecker fashion, may sometimes be observed perched across the smaller twigs. I have only obtained it in the neighbourhood of Colombo; but it is also found in the south.

Bill greenish slate; irides pale buff; orbital skin purple; feet greenish slate.

Ceylon, S. India?

69. CHRYSOCOLAPTES FESTIVUS, Bodd.

By the kindness of Lord Walden, I am enabled to include this handsome Woodpecker in my list of Ceylon birds. The two specimens, male and female, in his collection, are labelled "November 1865, Cocarry." The name is probably that of a small native village in the north-west of the island, not far from the Aripo district, as I have reason to know that the birds collected at that date for Lord Walden were procured not many miles from where I was afterwards residing. Future collectors in Ceylon, who are not familiar with this species (described by Jerdon under the name of *C. goensis*, Gmel.), may recognize it by its black back and golden wings, the underparts being coloured much as in *C. stricklandi*, Layard.

Ceylon, parts of South and Central India.

70. CHRYSOCOLAPTES STRICKLANDI, Layard.

Peculiar to Ceylon, and confined to the hills. It is abundant at Nuwara Eliya and in all tree-jungle in that district, ranging from the forest-clad Pedrotalagalla (8200 feet), the highest point in the island and overlooking the Nuwara Eliya plain, through the coffee-districts, to the Kandy country. The female has the whole top of the head and crest black, spotted with white; and a young bird of that sex had the lower part of the back black, faintly barred with white, with crimson feathers appearing among the others: the bill in this bird was only two thirds the length of that in the adult.

Layard states that the irides of this species are red-brown; but I think he must have been mistaken, as in four specimens I obtained at Nuwara Eliya, and which I myself prepared, the irides were buff, those of the young bird being rather paler than the others.

Bill greenish white; irides buff; feet greenish slate.

Ceylon hills.

71. CHRYSOPHLEGMA CHLOROPHANES, Vieill.

I have only procured this species at the foot of the hills in the south; but it has been also obtained in other places much nearer Colombo. When not feeding, it is in the habit of stationing itself on the highest branch of a dead tree, and there repeating its peculiar note, which has little of the harsh sound so generally characteristic of the Woodpeckers.

Bill slate, with the base yellow; irides dull red; feet dull green.

Ceylon, S. India.

72. MICROPTERNUS GULARIS, Jerdon.

Two specimens of this Woodpecker were procured by me a few miles from Colombo. Although decidedly a scarce species, and I shot these two birds in January and July, they were both killed in native gardens not a quarter of a mile apart. Layard met with it in the south; and I have seen one or two skins from the central district.

Ceylon specimens have the lower parts rather darker than those from India. Layard gives this bird under the name of *M. phaioceps*, Blyth.

Bill lead-grey; irides red-brown; feet slaty brown.

Ceylon, S. India.

73. BRACHYPTERNUS AURANTIUS, Linn.

Recorded by Layard as very abundant in the Jaffna peninsula in the north of the island. I occasionally saw at Aripo what may have been this species, and heard its remarkable cry, but failed to procure a specimen.

73 *bis*. BRACHYPTERNUS PUNCTICOLLIS, Malh.

A specimen of this bird has been quite recently received by me from the western side of the island. A further examination of the Golden-backed Woodpeckers found in Ceylon therefore appears desirable, as the species generally met there is more likely to be *B. puncticollis*, common in Southern India, than *B. aurantius*, which has a more northerly range. *B. puncticollis* may be recognized by its white-dotted throat and under neck.

Ceylon, S. India.

74. BRACHYPTERNUS CEYLONUS, Forster.

Peculiar to Ceylon; not uncommon near Colombo, but very numerous in the south. Dr. Kelaart* says it is "found in great abun-

* The results of my own collecting at Nuwara Eliya and in the neighbouring jungles during almost every month in the year oblige me frequently to receive with suspicion the notices by the late Dr. Kelaart of the occurrence of birds, and of their abundance, in that district. The subjects to which Dr. Kelaart gave his special attention were mammals and reptiles, and in these he did good work; but ornithology was a very subordinate study with him, and he rarely, if ever, used a gun.

dance at Nuwara Eliya;" but I have never seen it on the hills, and I have no doubt that *Chrysocolaptes stricklandi*, another red-backed Woodpecker already noticed, was mistaken by Dr. Kelaart for this species. This bird especially frequents the cocoanut-trees, and is a conspicuous object as it works its way by rapid jerks up the slender trunks of these palms. The natives in the south call it the "Toddy-bird," and say it visits the palms for the sake of the toddy, which is largely collected in that and some other parts of the island. The insects feeding on the toddy are no doubt the real attraction. Its principal food is ants, as is the case with all the low-country Woodpeckers, their stomachs being always found more or less crammed with these ubiquitous and troublesome insects. Both sexes have the red occipital crest; but the male has the top of the head sprinkled with the same colour, whilst the female has that part spotted with white.

Bill slate; irides red; feet pale greenish.
Ceylon.

75. MEGALAIMA ZEYLANICA, Gmel.

Peculiar to Ceylon. This bird is closely allied to *M. caniceps*, Franklin, and is noticed under that name by Layard; but it is a smaller bird, with the anterior portion of its plumage much browner, and the lighter markings reduced in size and distinctness. It is common in the low country, except in the north. I have never seen or heard it in the Aripo district; and it does not ascend above the lower hills. The flight of this bird is straight, but rather heavy. It feeds on berries, and may be often seen clinging to the smaller twigs on the outside of a tree whilst eating the fruit which grows at their extremities.

Bill dull orange; irides brown; orbits yellow; feet yellow.
Ceylon.

76. MEGALAIMA FLAVIFRONS, Cuvier.

Peculiar to Ceylon. It is not confined to the hills, as stated by Layard, but is exceedingly abundant even close to Colombo, and ranges from near the coast to an elevation of 5000 feet. It is the only Barbet I have seen so high; and I have not observed it there except during the N.E. monsoon, a time at which there is a great influx of migratory birds and of low-country species to the hills. I have not seen it in the north; and it is not so numerous as the last species in the extreme south of the island. At the village of Heneratgodde, about 17 miles from Colombo, in a district abounding with native gardens, cocoanut-topes, and paddy-fields, and where I have collected a great variety of birds, the air used to resound with the loud notes of this and the preceding species of Barbet, a partial silence only occurring for an hour or two during the extreme heat of the day. *M. flavifrons* is a more sprightly bird than *M. zeylanica*, and can be readily distinguished from it when on the wing.

Bill horny yellow; irides red-brown; feet dark grey.
Ceylon.

77. XANTHOLÆMA INDICA, Lath.

Layard speaks of this bird under the name of *Megalaima philippensis*. It is confined to the north. I have only met with it at Aripo, where it is found throughout the year. Perched on some dead branch near the top of a tree, with its throat swelling and its head bowing at the utterance of each note, this handsome little Barbet repeats its monotonous cry of *poohp, poohp, poohp* for half an hour at a time, with only occasional intervals of a minute or so. Whilst thus engaged it changes the direction of its head with every note; and to this I think is mainly due the often noticed variation in the sound; but the range of direction is a full semicircle; and after often listening to the bird from different positions, I have no doubt that the voice is also dropped a little when the head is turned quite on one side. In Ceylon, as in India, this bird is known by the name of "coppersmith;" and that title is also applied about Colombo to the following species.

Bill black; irides red-brown; feet pink.

Ceylon, India, Burmah, Malaya.

78. XANTHOLÆMA RUBRICAPILLA, Gmel.

Peculiar to Ceylon, and common in the low country in the southern half of the island. I have also frequently seen it at Trincomalie; and Layard has procured it at Jaffna; but I have never met with it in the Aripo district. It is very common about Colombo. The note of this bird is very much like that of *X. indica*, but is not nearly so loud, and is repeated quickly four or five times without a pause; then resting for three or four seconds, the bird goes on as before. The call of *X. indica* sounds like distinct heavy blows of a hammer on a copper vessel heard in the distance; that of *X. rubricapilla* like a series of light taps on the same metal.

Bill greyish black; irides red-brown; feet pink.

Ceylon.

In a young bird I obtained in July near Colombo the bright colours about the head and neck were not developed, except a small patch of orange below the eye and a tinge of yellow on the forehead. The bill was dark grey; irides pale brown, and feet dusky flesh.

79. CUCULUS CANORUS, Linn.

Recorded by Layard as found in Ceylon. He obtained one example of it near Colombo; but I have not met with it.

Asia, Africa, Europe.

80. CUCULUS SONNERATII, Latham.

Kelaart procured several specimens; and I have seen it from near Colombo and the lower hills.

Ceylon, S. India.

81. CUCULUS MICROPTERUS, Gould.

This Cuckoo was recorded by Dr. Kelaart as a mountain species;

but the only two examples I met with were obtained in half-cultivated land in the low country near Colombo. To this species may probably also be referred a bird closely resembling *C. canorus* which I watched for some time in an English garden at Colombo a few days after my arrival in Ceylon.

Bill yellowish, dusky above; irides pale yellow; feet yellow.

Ceylon, India, Burmah, Malaya, China.

Layard has described a Ceylon Cuckoo under the name of *C. bartletti*; but there is some doubt about what the bird is. Jerdon places it under *C. poliocephalus*, Lath., which, however, has not been recognized in the island; it may be *C. sonneratii*.

82. HIEROCOCCYX VARIUS, Vahl.

This bird is probably a migrant from India. Layard procured it near Colombo; but I have only met with it on the hills at Nuwara Eliya, in the beginning of the year.

Bill greenish yellow, dusky above; irides yellow; feet yellow.

Ceylon, India, Burmah, Malaya.

83. POLYPHASIA PASSERINA, Vahl.

Referred to by Layard as *Cuculus tenuirostris*, Gray, and by Jerdon (B. of India, vol. i. p. 333) as *P. nigra*, apud Blyth. Jerdon has lately, however (Ibis, 1872, p. 14), gone more into the nomenclature of the species, and placed it under the above heading. It is migratory to Ceylon, but appears much later than most of the other visitants. Layard gives February for its arrival about Jaffna; but I have first seen them at Aripo in the beginning of January, and then they all at once became abundant, frequenting low bushes in the jungle, and ranging in colour from dark grey to completely rufous on the upper parts. No two specimens were exactly alike; but all were of some shade of grey beneath, and more or less barred. The rufous-bellied species is an eastern bird, and unknown in Ceylon.

Bill black above, red-brown below; irides hazel; feet dull yellow.

Ceylon, India.

84. SURNICULUS DICRUROIDES, Hodgson.

Resident, but rather a scarce bird in Ceylon. It has been found on the lower hills, near Kandy; and I have obtained specimens in immature and adult plumage in the low country near Colombo, and in the extreme south of the island. Although at first sight this Cuckoo may be readily mistaken for a King Crow, having the same general colour and remarkable shape of tail, it is not difficult to distinguish it when within a moderate distance. It usually perches lower and alights more frequently on the ground, besides having little of the Flycatcher-action so common among the *Dicruri*.

Bill black; inside of mouth deep orange; irides dark brown; feet black.

Ceylon, India, Burmah.

85. LAMPROCOCCYX MACULATUS, Gmel.

This beautiful Emerald Cuckoo was first made known from Ceylon, and appears to be the one given by Kelaart and Layard in their Catalogue (1853) under the name of *Cuculus xanthorhynchos*, Horsf., a Malay species. I have seen no specimens of it; and it is undoubtedly rare.

Ceylon, India.

86. COCCYSTES JACOBINUS, Bodd.

C. melanoleucos, Gmel.; Jerdon, B. of Ind. no. 212.

Common in the north of the island. These birds are always numerous in the Aripo district, frequenting bushes and low trees, and usually perching on the highest branches. In December and January (the commencement of the breeding-season with many birds in Ceylon) they are very noisy and incessantly flying from one place to another, one or more males apparently chasing the female, and uttering their clamorous cries. Layard mentions finding a young Cuckoo of this species under the care of a pair of Mud-birds (*Malacocercus*); and, from the frequent battles I observed between this Cuckoo and a pair of *Malacocercus striatus* which were nesting in a low tree close to my house, I have no doubt that the Black-and-white Crested Cuckoo frequently lays its eggs in the nest of that common Babbler.

Bill black; irides red-brown; feet lead-colour.

Ceylon, India, Africa.

87. COCCYSTES COROMANDUS, Linn.

I believe this handsome Cuckoo is very scarce in Ceylon. I have only seen two specimens, both from the Kandy district.

Bill black; irides reddish brown; feet lead-colour.

Ceylon, India, Burmah, Malaya.

88. EUDYNAMIS HONORATA, Linn.

Formerly known as *E. orientalis*, Linn.

Layard says of this bird in Ceylon:—"Wherever Crows are found, there the Coël is found also." I have only seen this bird, however, during the N.E. monsoon, from November to April. During this period it is very common in the Aripo district; and I have also found it numerous near Colombo. After April, I have never met with the species until towards the end of the year. I believe it is a true migratory bird. Among the specimens I have shot in January and February is a young male in the spotted plumage, but having the top of the head rusty brown; in other respects the colours are the same as, but purer than, those in the female. These Cuckoos are very noisy in the morning and evening.

Bill dull green; irides crimson; feet slate-colour.

Ceylon, India, Burmah, N. Malaya, S. China.

89. ZANCLOSTOMUS VIRIDIROSTRIS, Jerdon.

This is a low-country species, and, so far as I know, not extending

to the south of the island. It is found abundantly throughout the year in the north; and I have occasionally met with it near Colombo. It is skulking in its habits, creeping rapidly through the low bushes, and rarely exposing itself when it has once been alarmed.

Bill apple-green; irides deep red, orbits cobalt; feet dark leaden.

Ceylon, S. India.

90. PHŒNICOPHÆUS PYRRHOCEPHALUS, Forst.

This Cuckoo has hitherto been found only in Ceylon. It inhabits tree-jungle in the low country near the foot of the hills. One specimen, alive but injured, was brought to me by some natives who had caught it only a few miles from Colombo. I saw a second flying across a road in the Central Province, and followed it for some distance through the jungle, but failed to obtain it. Its flight was weak; but it moved rapidly through the trees, half flying and half hopping from branch to branch. Layard says the irides of this Cuckoo are white; but in the living bird (a male) I had they were brown, and they are marked as of that colour in specimens in Lord Walden's collection.

Bill light apple-green above, bluish green below; irides brown; orbital skin crimson; feet dark leaden.

Ceylon.

91. TACCOCUA LESCHENAULTII, Less.

I am indebted to Mr. Forbes Laurie for the opportunitity of examining a male specimen of this fine Cuckoo, hitherto unknown in Ceylon. He tells me it was obtained in the Doombera valley (1800 feet), not far from Kandy, that it came into his hands immediately after it was shot, and he himself prepared the skin. As a S.-Indian species it is likely to occur in Ceylon; and the Doombera valley is a wild district, from which I have known many of the rare and peculiar Ceylon birds to have been obtained.

Bill red, tip yellow; irides reddish; feet lead-colour.

Ceylon, S. India.

92. CENTROPUS RUFIPENNIS, Illiger.

Common generally in the low country. It was very abundant at Aripo, feeding very much on the ground, where there was always a large supply of grasshoppers.

Bill black; irides red; feet black.

Ceylon, India, Burmah, Malaya.

93. CENTROPUS CHLORORHYNCHUS, Blyth.

Peculiar to Ceylon, and, I believe, almost confined to the lower hills in the Central district. I have only seen this bird alive on one occasion, and then in thick jungle under trees. It is either very scarce or escapes notice from its skulking habits. From *C. rufipennis* it may always be distinguished by its green bill, if

not by the very rich purple gloss over the anterior portion of its plumage.

Bill pale green; irides red; feet black.

Ceylon.

94. NECTAROPHILA ZEYLONICA, Linn.

Common in the low country. I have frequently seen it in the gardens at Colombo; but have not met with it at Aripo. Layard speaks of it as abundant in the southern and midland districts.

Ceylon, India.

95. NECTAROPHILA MINIMA, Sykes.

I do not remember seeing this bird in the Aripo district, although Layard states that it is common in the north of the island. It is occasionally seen at Colombo.

Ceylon, S. India.

96. ARACHNECHTHRA ASIATICA, Latham.

This species was very common at Aripo, and was found there at all seasons. I have also seen it in the south. At a Government rest-house in the extreme south of the island, where I was staying in August 1869, a pair of these birds had a nest in the veranda; it was fastened to the end of an iron rod hanging from the roof and once used for suspending a lamp. The birds showed very little fear, although I was for several days sitting within a few feet of the nest, engaged in the preparation of specimens. I have obtained this species at Nuwara Eliya in October.

Bill black; irides red-brown; feet black.

Ceylon, India, N. Burmah.

97. ARACHNECHTHRA LOTENIA, Linn.

This is a very common species at Colombo, and is said by Layard to be plentiful in the southern and midland districts. I have no note of its occurrence at Aripo. Some specimens have the bill very much curved.

Bill black; irides brown; feet black.

Ceylon, S. India.

98. DICÆUM MINIMUM, Tickell.

I have procured this little bird in all parts of the island; and specimens obtained at Nuwara Eliya were precisely the same as those from Aripo and elsewhere.

Bill flesh-colour; irides brown; feet fleshy brown.

Ceylon, India, Burmah.

99. PIPRISOMA AGILE, Tickell.

Layard records having obtained a pair of these birds on the Central road.

Ceylon, India.

100. DENDROPHILA FRONTALIS, Horsf.

Layard speaks of this bird as "abundant about jack-trees," which are only found in the low country. Although I have known it killed in such parts of the island, I have always considered it a hill species, as it is one of the common birds at all seasons at Nuwara Eliya and on the upper hills. Jerdon states that in India it is most abundant on the Neilgherries—a situation corresponding in a remarkable manner with the higher hills in Ceylon, the birds and plants of the two ranges being in most respects the same.

These little Nuthatches appear to keep in small parties at all times of the year, and are very active in examining the branches of any trees they may happen to visit. The colours of this bird soon lose their brightness after death; and the peculiar delicacy of the tints can hardly be discovered in a cabinet specimen.

Bill coral-red; irides golden; feet yellow-brown.

Ceylon, India, Assam, Burmah, Malaya.

101. UPUPA NIGRIPENNIS, Gould.

Very abundant in the Aripo district during the winter months, and occasionally in the summer. Some of these birds are no doubt residents in Ceylon; but their numbers in the north are largely increased about October, either by migrants from India or from the east side of the island. Layard speaks of it under the name of *U. senegalensis*, Sw., and says he "shot young birds, not fully fledged, in August." This would agree with the breeding-time of the Hoopoe in Burmah, of which Jerdon says:—"I found it breeding in holes of trees in June and July." If Layard's birds, however, were bred in Ceylon, as might be supposed from his statement that they were not fully fledged, then there are two distinct breeding-seasons for this species in the north of the island, as in January 1870 I found, in my compound at Aripo, a nest of the Hoopoe in a hole in a small mustard-tree (*Salvadora persica*). I caught the old bird as it was leaving the nest; and after enlarging the hole, came down to three young birds, just hatched, and resting on a bed of rotten wood. These nestlings were quite naked, and their bills were barely a quarter of an inch long.

The Hoopoe was found by Layard on the east and south-east coasts, and once at Colombo. I have also had a specimen from the neighbourhood of Kandy.

The flight of this bird is easy and undulating; and its note is repeated whilst it is on the wing, as well as when perched on the top of a tall bush.

There is some variation in the colours and dimensions of the Hoopoes found in Ceylon, the tendency being towards the characters of the Burmese variety described by Jerdon. Of three specimens shot at Aripo, one has the bill at front 1·9 inch, the closed wing 5; first primary entirely black, chin whitish, and the feathers of the posterior half of the crest white between the black and rufous, The last characters have been regarded as specially belonging to

U. epops; but in this specimen there is no white spot on the first primary. This bird was killed in December. In a second specimen, shot in February, the bill is 2·25 inches, closed wing 5·1, the general colour of the bird very rufous, and a white spot on the left first primary, but only a very minute speck on the right. A third, a male killed in December, agrees generally with the Indian form, has no spot on the first primary, but has the bill at front 2·15 inches, and the closed wing 5·25. The last and largest of these specimens did not exceed 10·8 inches in length; and they may all doubtless be referred to *U. nigripennis*, if that form be really distinct from *U. epops*.

Bill black, base flesh-colour; irides brown; feet dark leaden.

Ceylon, India, Burmah?

102. Lanius erythronotus, Vigors.

Very common in the Aripo district and in other parts of Northern Ceylon. I have also seen it occasionally in the Cinnamon Gardens at Colombo; but it does not appear to visit the hills. A cup-shaped nest of this species was built in a thorn-bush close to my house at Aripo; but the young birds had left it before my arrival there in the beginning of April. In a subsequent year I obtained young birds able to fly as early as the middle of February, and older ones nearly full-grown in March. These young birds were all very rufous, with the head, upper back, and flanks closely barred, the lower part of the back more broadly marked, and the secondaries rufous with their centres dusky. Layard says "the young are fledged in June;" but they are out some months earlier than that in the Aripo district. These birds feed very much on dragonflies and grasshoppers.

Bill black; irides dark brown; feet black.

Ceylon, India, Central Asia.

103. Lanius cristatus, Linn.

Referred to by Layard as *L. superciliosus*, Linn. This bird I have found common in the north, west, and central parts of Ceylon during the winter months. It remains about Aripo from October to April, and is tolerably common at Nuwara Eliya during the same period. Layard mentions their being particularly numerous at Hambantotte, on the south-east coast, but does not say at what time of the year. There is probably a migration of this species from the east to the west side of the island at the beginning of the N.E. monsoon, at which time no doubt many of these birds also come from India. A specimen obtained at Aripo in October is of a much richer brown than others I shot at Nuwara Eliya in February. These birds are fond of perching on the extreme top of a bush.

Blyth (Ibis, 1867, p. 304) refers the birds described by Layard to "*L. lucionensis*, Scopoli (?)," a race of *L. cristatus*, "distinguished by its prevalent ashy-brown hue." This character is not uncommon in Ceylon specimens which have old, worn plumage; but I have not seen it in newly moulted birds.

Bill dusky; irides dark brown; feet dark leaden.

Ceylon, India, Andamans, Malacca.

104. TEPHRODORNIS PONDICERIANA, Gmel.

A careful comparison of a series of *T. affinis*, Bl., from Ceylon, with a number of *T. pondiceriana* from India, has satisfied me that there is not sufficient ground for separating them specifically. The Ceylon birds appear to be smaller; but the depth of the general ashy brown of the upper surface varies in both, and to much the same extent. The supercilium also varies in distinctness in the birds from the two countries, but in those from India the maximum development is perhaps greater than in specimens from Ceylon.

These birds are common in the north and west of the island during the winter months, and probably migrate from the eastern side. They breed early in the year; and the young birds in their spotted plumage have been procured by Mr. Legge, in April, from the cinnamon-gardens at Colombo. Birds of the year are paler than in the following season. This may not have been known to Mr. Blyth when he described the Ceylon species as greyer than those from India.

Bill dusky; irides dull yellow; feet dusky lead-colour.

Ceylon, India, Assam, Upper Burmah.

105. HEMIPUS PICATUS, Sykes.

This bird is rare in the low country, and seems to be chiefly found on the upper hills. It is a common bird at Nuwara Eliya throughout the year, frequenting high bush jungle or low trees. Young birds have the colours less decided than adults.

Bill black; irides yellow; feet black.

Ceylon, S. India.

106. VOLVOCIVORA SYKESII, Strickl.

Generally distributed over the low country; it is resident in the Aripo district, and I have found it common near Colombo and in the extreme south. Although I have shot a great many of these birds, I have never obtained a female with any other than the barred under plumage and the grey head, and I cannot confirm Blyth's statement that the adult female has a black head and neck as in the male. The black in the young male first appears in spots on the top and sides of the head.

Bill black; irides brown; feet black.

Ceylon, India.

107. GRAUCALUS LAYARDI, Blyth.

Graucalus pusillus, Bl.

A smaller bird than the N. Indian *G. macei*, Less., with which it has been confounded. It differs also (Jerdon, 'Ibis,' 1872, p. 117) in having the under wing-coverts strongly barred, the abdominal bars absent in the adult male, and the outer tail-feathers only slightly tipped with white.

I have not seen this species alive; but it is occasionally found in

the Kandy district and, according to Layard, who speaks of it as *G. macei*, in the S. and W. provinces.

Ceylon, S. India.

108. PERICROCOTUS FLAMMEUS, Forster.

Widely distributed, but nowhere very common. I have not met with it at Aripo, but have obtained it near Colombo; and it is tolerably numerous in the cold season on the hills. I have seen it more abundantly at Nuwara Eliya than elsewhere. It is generally in pairs, and perches high up on the trees.

Bill black; irides brown; feet black.

Ceylon, India, Assam.

109. PERICROCOTUS PEREGRINUS, Linn.

Common all over the island. It is resident in the Aripo district, and is found at Nuwara Eliya in the cold season. It does not frequent trees so much as bush-jungle; and I have never observed it perching very high, as is the marked habit of the preceding species.

Bill black; irides brown; feet black.

Ceylon, India, Andamans, Burmah.

110. BUCHANGA MINOR, Blyth.

This bird has been separated from the common Indian species (*B. macrocerca*), which it resembles in colouring, but from which it differs in all its dimensions. My finest specimen of *B. minor* is 10·5 inches total length instead of 12; wing 5·25 instead of 5·75 or 6; and other parts in proportion. The tail of the Ceylon bird is always less deeply forked than in the Indian species; and the small white rictal spot is frequently absent. Whatever may be thought of the value of these differences, they are constant; and I have not heard of the larger *B. macrocerca* of India being found in Ceylon. *B. minor* is abundant in the north; it is very common at Aripo, and is the only species of Drongo Shrike I have seen there. It is also found about Colombo, but by no means commonly within my experience. Its place there and in the south is occupied by another species. None of the Drongo Shrikes in Ceylon go above the lower hills, and for the most part they are confined to the low country.

Bill black; irides red-brown; feet black.

Ceylon.

111. BUCHANGA LONGICAUDATA, A. Hay.

I have seen this species on the tops of the trees in forest-jungle between Kandy and Trincomalie, and shot one specimen in a small wood about sixteen miles from Colombo. Layard says it is common in the Jaffna peninsula, and that "it frequents open lands, and perches on the backs of cattle to seek for ticks, on which it feeds largely." There must surely be some mistake about the species to which Layard here refers. His account agrees precisely with the habits of *B. minor*; and Lord Walden, who first described *B. longicaudata*, from India, where it is well known, tells me it is strictly a

forest species, frequenting high trees, and is never seen on the backs of cattle.

Bill black; irides red-brown; feet black.

Ceylon, India.

112. BUCHANGA CÆRULESCENS, Linn.

Layard speaks of having procured one or two specimens of this species at Point Pedro, in the extreme north; but it is not otherwise known from Ceylon.

Ceylon, India.

113. BUCHANGA LEUCOPYGIALIS, Blyth.

Peculiar to Ceylon. Allied to *B. cærulescens*; but differing from that species in being smaller and having the dark grey of the breast continued (but gradually becoming paler) towards the vent, with the white confined to the under tail-coverts. In the immature bird the whole of the abdominal region is very dark grey, and the under tail-coverts have three or four broad dark bands on a paler ground.

This is the common species about Colombo and in the southern district. I have never seen it in the north.

Bill black; irides brown; feet black.

Ceylon.

114. DISSEMURUS LOPHORHINUS, Vieill.

Peculiar to Ceylon. *D. edoliiformis*, Blyth, is apparently the same species. The typical character consists in having the head subcrested, with the simple form of tail found in *Buchanga*. In Lord Walden's large collection of *Dicruri* from Ceylon, there are many examples showing an apparent gradation in the form of the tail between this species and *D. malabaricus*; but as the true *D. lophorhinus* is found in localities where the racket-tailed species is unknown, I shall keep them distinct, and in my notice of the next species refer to the apparent gradations between them.

D. lophorhinus is found on some of the lower hills, and in wild districts in the low country in the southern half of the island. It appears to be quite a jungle bird.

Bill black; irides brown; feet black.

Ceylon.

115. DISSEMURUS MALABARICUS, Scop.

This is no doubt the species referred to by Layard under *Edolius paradiseus*, Linn., as it has been obtained in abundance in the district where Layard procured his specimens. It is quite confined to the jungle, and frequents the forests in the northern and central parts of the island. An immature specimen I shot in very wild country between Kandy and Trincomalie has the outer tail-feathers three inches longer than the next; no part of the stem is bare; but the inner web is very much narrowed just on a level with the tip of the adjoining feather. Lord Walden has received many similar specimens and others with the long racket-feathers in different stages of

growth, one example showing a difference in the intermediate length of bare stem in the growing feathers on the two sides of the tail. The short tail-feathers in some specimens appear to me to be possibly a character of youth; but they are regarded by Lord Walden as individual variations; and the attention he has given to the *Dicruri* entitles his opinion to considerable weight.

Bill black; irides brown; feet black.

Ceylon, S. India.

116. Artamus fuscus, Vieill.

Generally distributed over the low country, but is locally abundant at certain seasons. It is very common at Aripo and in the neighbourhood of Colombo during the N.E. monsoon. I have always found it in small parties and easy of approach.

Bill pale blue; irides dark brown; feet dark slate.

Ceylon, India, Burmah.

117. Tchitrea paradisi, Linn.

Generally distributed over the low country, and, at certain seasons, not uncommon on the lower hills. It is, however, a great wanderer, and very uncertain in its movements. At Aripo they have at times been very numerous; and then I have not seen one for several weeks. They seem to be of a fearless disposition, and used sometimes to fly up under the roof of my veranda after spiders when I was standing within a few yards of them. I have procured specimens in all states of plumage at different times, and two examples showing the change from the red to the white feathers—one of them at Aripo, the other at Colombo, and both in January. Layard obtained one in February in which the change was far advanced. They are common about Kandy towards the end of the year.

Bill leaden blue; irides brown; feet pale blue.

Ceylon, India.

118. Myiagra azurea, Bodd.

Widely distributed, according to Layard, who, however, speaks of this bird as *M. cærulea*, Vieill. I have only seen it from the western province, where it is locally not uncommon.

Ceylon, India to China, Malaya, Andamans?, Philippines.

119. Leucocerca aureola, Less.

Leucocerca albofrontata, Frankl.

Layard records the occurrence of a *Leucocerca* in Ceylon which was described by Blyth as *L. compressirostris*, from its differing from the above species in having the bill more compressed. Mr. Blyth tells me, however, that he believes now it was only a variety and that it should come under the above heading. I have examined a Ceylon specimen of *L. compressirostris*; and the character of the bill is very decided, so much so as almost to justify the separation of the bird from the *Myiagrinæ*, if in other respects it did not agree so closely with *L. albofrontata*. That species, however, has been received from

Ceylon; and *L. compressirostris* may perhaps best be considered a variety of it.

Ceylon, India.

Leucocerca ——? Mr. Hugh Nevill (J. R. A. S., Cey. Br., 1867–70, pt. i. p. 138) records the occurrence in the country round Nuwara Eliya of a Flycatcher which he calls *Leucocerca fuscoventris*, Franklin. The characters he gives of the species are evidently taken from a description of *L. pectoralis*, Jerdon; and from what I know of the circumstances I believe I am quite justified in saying that Mr. Nevill never saw the Nuwara-Eliya bird except alive in the jungle.

It is not unlikely, however, that a *Leucocerca*, probably *L. pectoralis*, may be found on the Nuwara-Eliya hills, although it has not yet been clearly identified.

120. MYIALESTES CINEREOCAPILLA, Vieill.

Resident and very common in the Nuwara Eliya district. It frequents the lower branches of trees and is very bold and familiar, so much so as to be rather a pest when one is collecting in the jungle, from its habit of following one about or flitting from branch to branch just in front of one. I believe that in Ceylon it is almost entirely confined to the upper hills.

Bill dusky; irides brown; feet fleshy brown.

Ceylon, India to Burmah and Tenasserim, China.

121. ALSEONAX LATIROSTRIS, Raffles.

A winter visitor to Ceylon, arriving early in October at Aripo. It is common there until April, and is also found about Colombo at the same season. Its manners are precisely the same as those of the European *B. grisola*, to which species it is closely allied.

Bill black, base yellow; irides brown; feet black.

Ceylon, S. India, China.

122. ALSEONAX TERRICOLOR, Hodg.

Butalis muttui, Layard, described by him from a single specimen obtained at Point Pedro, agrees with Hodgson's *A. terricolor* from India. It is very rare in Ceylon.

Ceylon, North and Central India.

123. OCHROMELA NIGRORUFA, Jerdon.

Jerdon says of this Flycatcher that "it has hitherto (1862) only been found on the summit of the Neilgherries and highest mountains of Ceylon." I can find no record, however, of this species occurring in Ceylon except that by Layard, who says he saw a drawing made by Mr. E. L. Mitford from a specimen he obtained at Ratnapoora. This is in the low country and probably not a hundred feet above the level of the sea.

124. EUMYIAS SORDIDA, Walden.

This species, distinguished and described by Lord Walden (Ann. Nat. Hist. 1870, p. 218), is very common at Nuwara Eliya. I have

observed it there at all seasons; but it appears to have been mistaken for *E. melanops*, Vigors, by both Kelaart and Layard, who evidently refer to it under that name in their catalogues. A specimen sent by Layard is in the British Museum, and is given in Gray's 'Hand-list' (4897) as *E. ceylonensis*, n. sp.?

The general colour of the head, back, and outer edges of the quill-feathers is a dark bluish grey; throat and breast more dingy, and becoming paler towards the vent; forehead and chin bright blue; wings and tail dusky.

Bill black; irides brown; feet black.

Ceylon.

125. CYORNIS RUBECULOIDES, Vigors.

Probably only an occasional visitor to Ceylon. Layard records having obtained a few specimens in the north of the island in October 1851; and I have examined specimens from Ceylon in Lord Walden's collection. Examples of this species from Ceylon and Burmah differ from Indian birds in having the orange colouring of the breast running up the centre of the throat, a peculiarity pointed out to me by Lord Walden.

Ceylon, India, Burmah.

126. CYORNIS JERDONI, G. R. Gray.

This species was at one time considered identical with *C. banyumas*, Horsf., from Java, and is given under that name by Jerdon in his 'Birds of India;' but it has been separated by Mr. G. R. Gray as distinct. It is a resident in Ceylon and not uncommon in the low country between Colombo and Kandy, but has not been recognized as being widely distributed. I have obtained specimens a few miles from Colombo in July. Mr. Legge describes the female as being brighter on the upper surface than the male, but this is not in accordance with what I have observed.

Bill black; irides brown; feet lavender (brown in dry skins).

S. India and Ceylon.

127. ERYTHROSTERNA HYPERYTHRA, Cabanis. (Plate XVII.)

This Robin Flycatcher was described in 1866 by Cabanis (Journ. f. Orn. p. 391) from a specimen sent from Ceylon by my friend Mr. Nietner; and that example (in the Berlin Museum) was, I believe, the only one until now which had been brought to Europe. I was fortunate enough to obtain two specimens of this species at Nuwara Eliya in February 1870, and I have no doubt that it is not uncommon on the hills at that season. Mr. Nietner probably obtained his bird on his estate about 2000 feet below Nuwara Eliya; and further inquiries may perhaps lead to its discovery on the Neilgherries*.

* Since the above was written, a specimen of this Flycatcher has been sent home from Goona, Central India. It is in full breeding-plumage, and was supposed to be *E. parva*. It is very probable that these two species have been confounded when not in full plumage, and that *E. hyperythra* is not so rare or so local as appears to be the case at present.

The distinguishing characters of the species are the rich orange-brown of the throat and breast, and the black stripe running from the bill down the sides of the neck to the breast and terminating below the bend of the closed wing. The specimens I obtained were both males, adult and immature; and the above characters are distinct in both, but much more so in the older bird.

These birds frequented low thin jungle; and I did not hear them utter any note.

Bill dusky above, yellow beneath; irides dark brown; feet purplish brown.

Ceylon, Central India.

Jerdon mentions that *E. leucura* is found in Ceylon; but I cannot find any special record of its occurrence there. It may have been confounded with *E. hyperythra*.

128. BRACHYPTERYX (?) PALLISERI, Blyth. (Plate XVIII.)

Peculiar to Ceylon. The generic position of this bird is not very clear. It was placed by Blyth doubtfully in *Brachypteryx*, but differs from the birds of that genus in the sexes being alike in colouring and in the well-developed tail. I believe it will require generic distinction; but for the present I shall leave it in *Brachypteryx*.

It is a species confined to the upper hills, and is by no means uncommon in the Nuwara Eliya district; but, from its habits, it is not an easy bird to watch or to obtain. It frequents the low brushwood in the true jungle, creeping about the stems of the underwood close to the ground, and may sometimes be seen busily examining the dead branches of some fallen tree. Frequently it betrays its close neighbourhood by its "cheep" once or twice repeated; and it will show itself for a moment within two or three yards of one; then it is lost again in the thick jungle. By giving up a good deal of time I succeeded in obtaining a few specimens; but I have often been out for many hours without being able to get a shot, although I have occasionally heard the bird close to me. It will sometimes show itself on a jungle-path; but it then keeps close to the side, turning over the dead leaves in search of insects, and disappearing on the slightest alarm. When on the ground it often jerks its tail up after the manner of the Robins; but I have not observed this habit when it has been on the stems of the jungle plants or creeping about the dry sticks. The sexes are alike in colouring. I have one specimen which on dissection proved to be undoubtedly a male; and it could not be distinguished by any external character from the female. Two other birds, of different sex and evidently young, were also alike, and differed from the adults only in the absence of the rusty throat and dark grey cheeks, and in having the tail shorter. I have been unable to ascertain any thing of the nesting-habits of this species; and the bird itself is exceedingly rare in collections.

The whole upper surface is of a dark olive-brown, the wings, rump, and tail being of a richer brown tint; chin and throat pale rusty, beneath the eye and the ear-coverts dark greyish; the underparts pale olive, becoming brown at the flanks, vent, and under tail-coverts.

Bill dusky above, dark grey below; irides pale buff; feet dark flesh.

Ceylon (upper hills).

129. ARRENGA BLIGHI, n. sp. (Plate XIX.)

In the adult, or perhaps nearly adult, male the whole head, nape, and throat pure black; back, wing-coverts, and breast black strongly glossed with indigo; carpal joint dark smalt-blue; wings, tail, rump, flanks, and abdomen dusky brown, the two last slightly rufous. The upper tail-coverts, rump, and flanks are tinged with blue; and it is not improbable that in an older bird these parts may become of the same colour as the back and breast. In the young the whole bird is brown, darker on the upper surface and more rufous below, the feathers of the forehead, throat, and breast centred with yellow-brown, and there is an indication of blue on the carpal joint.

The dimensions of the adult male are:—length 8 inches, wing 4·4, tail 3·5, tarsus 1·4, bill at front 0·6.

Bill black; irides greyish; feet black.

An adult female, shot by Mr. Bligh, but almost knocked to pieces, had very much the character of a young bird of the same sex I obtained at Nuwara Eliya (fig. 2); and the wing-spot was brighter, but not of so deep a blue as in the male.

The only example of this new species of *Myiophonus* I saw in Ceylon was the immature bird I obtained at Nuwara Eliya in July 1870; and the tinge of blue on the wing led Mr. Samuel Bligh of Ceylon to the opinion that it was the young of a species he had shot on the hills two or three years before, and which had been sent with other skins to Mr. Master of Norwich. By the kindness of that gentleman I have been able to examine his specimen and compare it with the one I myself obtained. There is no doubt of their belonging to the same species; and as it has hitherto been unknown I have named it after my friend Mr. Bligh, who procured this first specimen of what is entirely a new form in the island.

Some credit is due to Mr. Edward Blyth for his remarks on the absence of certain birds on the Ceylon hills. He says ('Ibis,' 1867, p. 312) "That *Myiophonus horsfieldi* (or a specialized representative of this bird) has not been observed in the island is worthy of notice; but I have before expressed an opinion that the higher regions of Ceylon have not yet been sufficiently explored." At the time Mr. Blyth wrote this the first specimen of the Ceylon *Myiophonus* was probably on its way to England; and its true character has only now been recognized. Its nearest ally is *A. cyanea*, Horsf., from Java.

The habits of the Ceylon bird correspond, so far as is known, with those of the other *Myiophoni*. The young bird I procured at Nuwara Eliya was killed on a low branch of a jungle tree close to a little mountain-stream; and Mr. Bligh, who obtained his specimens at an elevation of between 4000 and 5000 feet, told me he had never met with the bird excepting in the immediate neighbourhood of water-courses. He writes me that although he has seen this species several

times it is very difficult to obtain. The bird frequently perches on a rock in the midst of some mountain-torrent, but is very impatient of observation. On these occasions it "gives utterance to a peculiarly long-drawn, plaintive though loud whistling note; at the same time the body is dipped and the tail slightly raised." It soon seeks shelter under the dense jungle foliage.

130. PITTA BRACHYURA, Linn.

Generally distributed in Ceylon during the winter months, and at that time very abundant at Aripo. Although most of these birds seen in Ceylon are probably visitors from India coming in October, I have reason to think some of them are residents, as I have frequently heard and more than once seen them at Nuwara Eliya in August. My house at Aripo was surrounded by *Suriya* trees, the branches of many of them touching the roof of the veranda; and to these trees the Pittas used to come every evening shortly before sunset, perching about six or eight feet from the ground and continually repeating their cry of "A-vitch-i-a" (the name given to the bird by the Singhalese), which was frequently followed by a low hissing scream. On being alarmed by my too close approach they would fly direct to the hedge about thirty yards distant and hide themselves under the darkest and thickest part of it. A frequent attitude of this bird when perched on a stout branch of a tree was with the head and body stretched up to the full height, the legs straight, and the tail turned upwards.

Bill orange, tip dusky; irides brown; feet flesh-colour.

Ceylon, India.

131. GEOCICHLA LAYARDI, Walden.

Peculiar to Ceylon. A single example of this Thrush was sent to Lord Walden in a collection of birds from the island. From what I heard in Ceylon from the person who made the collection I have no doubt this bird was obtained on the hills on the south-east side of the island, a part of the country which has not yet been properly examined and is likely to produce more novelties. This bird is described as more nearly allied to *G. citrina* of North and Central India than to *G. cyanota* of Malabar, with the orange colour of the underparts brighter and richer than in *G. citrina*, but not nearly so deep as in *G. rubecula* of Java.

The colours of this specimen are rich orange on the head, neck, and underparts, bluish grey above, and a white spot on the wing.

Ceylon.

132. TURDULUS WARDII, Jerdon.

Generally a rare bird in Ceylon; but Mr. Laurie tells me it is not uncommon during the north-east monsoon in some of the hill-forests. I have seen specimens collected by that gentleman and others from the Kandy district, but have not met with the bird alive.

Ceylon, India.

133. Merula kinnisi (Kelaart), Blyth.

Peculiar to Ceylon, and, I believe, confined to the upper hills. It is very common at Nuwara Eliya, frequenting alike the edges of the jungle and the gardens of the English houses, and often building in the stables and outhouses. It has the habits generally of the English Blackbird; but its song is by no means so fine.

The male has the whole upper surface black with a bluish-grey tinge, the underparts more dingy; the female has the upper colour less intense, and is dark ashy brown below. Young birds have the head and back brown, with the throat and breast mottled, the feathers being pale-centred and with dark brown tips.

Bill bright orange (adult), yellowish brown (young); irides brown; orbits yellow; feet yellow.

Ceylon.

134. Oreocincla nilgiriensis, Blyth.

This handsome long-billed Thrush was described by Layard under the name of *Zoothera imbricata* from a specimen received from Mr. Thwaites, who probably obtained it on the hills. It has since been recognized as the above species. I have examined two skins sent home by Mr. Bligh, and Layard's specimen now in the British Museum; and the scale-like appearance of their plumage, arising from the black border to each feather, is well marked.

"Bill corneous; legs brown" (*Layard*).

Ceylon; Neilgherries.

135. Oreocincla spiloptera, Blyth.

Peculiar to Ceylon. This is quite a jungle bird and not very uncommon in suitable places on the hills. Many specimens have been procured in wild country not far from Kandy, and in the forest-land adjoining the coffee estates between 2000 and 5000 feet high. I have not met with it at Nuwara Eliya.

Bill black; irides brown; feet pale brown.

Ceylon.

136. Pyctorhis sinensis, Gmel.

Layard observed this bird in widely separated localities in the low country, but does not speak of it as numerous. I have seen a specimen in the possession of Mr. Legge, R.A., at Colombo, which I believe he told me was killed near his house; and I have seen others from the Kandy country.

Ceylon, India to Burmah and China?

137. Alcippe nigrifrons, Blyth.

Peculiar to Ceylon. This little bird is well distinguished from the allied species *A. atriceps* by the greater part of the head being brown, the black being confined to the forehead, and a broad streak through the eye to the ear instead of covering the whole top of the head. I have not seen this bird in the north of Ceylon; and Layard does

not say where he discovered it; but it is abundant in the central and probably in the southern districts. It is, however, somewhat migratory within the island, and it is difficult to say to what cause its irregular movements are due. I have shot it both near Colombo and at Nuwara Eliya in January, and have fonnd it abundant at the latter place in July, August, and September; then it has entirely disappeared. It is an amusing little bird, usually found in small parties and frequenting underwood and low thick bushes, or creeping among the stems of the taller jungle-plants, occasionally coming to the edge of a path and betraying its presence by an angry hissing note, evidently intended to warn off intruders.

Bill dusky above, pale flesh-colour beneath; irides golden; feet purplish flesh.

Ceylon.

138. Dumetia albogularis, Blyth.

This species is said by Layard to be confined to the vicinity of Colombo; and although it is unlikely to be so purely local, I certainly never saw the bird alive until I became a resident close to the cinnamon-gardens in which he observed it. Like the following species it will probably be found in bush jungle in the interior as well as in the immediate neighbourhood of Colombo.

Ceylon, S. India.

139. Drymocataphus fuscicapillus, Blyth.

Peculiar to Ceylon and rarely met with. I only know of three* specimens having been obtained—two of them by Layard in Colombo and in the central road leading from Kandy northwards, and one (a male) by myself also from the latter part of the island. I found this bird among thick underwood in forest-jungle by the side of the road on which I was travelling; and it was perched within two feet of the ground when I had my first fair view of it as with outstretched neck and swelling throat it poured forth a torrent of babbling notes.

I have restored this bird to its original position in the genus *Drymocataphus*, as its bill does not agree in form with that of *Pellorneum*, and the fifth quill-feather is the longest, the fourth and sixth being equal and slightly shorter. The colour of the back, wings, and tail dark olive-brown, the last tipped rufous; wings and tail in some lights showing distinct transverse striæ; crown rich dark brown, the feathers slightly pale-shafted; lores, cheeks, sides of neck, and all the underparts pale rufous brown, the breast being rather darker.

Bill dusky above, flesh-colour below; irides red; orbits yellow; feet pale flesh.

Ceylon.

140. Pomatorhinus melanurus, Blyth.

Peculiar to Ceylon; rather local in its distribution, but generally numerous where it is found. It is very abundant at all times of the

* I have since seen a fourth, which was procured a few years ago by Mr. Bligh from the hills.

year at Nuwara Eliya and in the surrounding district, frequenting the primitive jungle with which the upper hills are covered. It is also found occasionally in wild country near Kandy, and was first seen by Layard "in low, scrubby, and almost impenetrable brushwood" a few miles from Colombo. It was probably not far from this last locality that I also met with it, in the low country, a wild district of no great extent, to which I have referred in my notice of *Harpactes fasciatus*. Like its congeners, however, this Scimitar-bill is essentially a hill bird. It creeps about underwood and the lower branches of trees, half opening and closing its wings, and assuming various kinds of strange attitudes. It is at all seasons noisy; and just about the pairing-time in February the cries of a party of these birds remind one more of a concert of Cats than any thing else. It is to this species the name of Gamut-bird is often applied, from the powerful notes of the male beginning very low and running up the scale; they have a very striking sound when heard amid the silence of the deep jungle.

The colour of the sexes is alike. The back, wings, flanks, vent, and under tail-coverts rich olive-brown with a rufous tinge, especially on the flanks; from the base of the upper mandible to the nape black, extending to the mixed olive-brown and black on the top of the head: throat, breast, middle of abdomen, and a conspicuous supercilium pure silky white; tail blackish brown. The young bird is much more rufous generally, and has the ear-coverts and the sides of the neck and breast quite rusty.

Lord Walden has a series of specimens of *Pomatorhinus* the localities of which are not very intelligible on the labels; but the birds were probably obtained in the south or south-east of the island. All these have the upper surface quite rufous, extending also to the tail. This colouring is not found in one of the many specimens I have from Nuwara Eliya, and is so marked as almost to justify a specific distinction.

Bill yellow, with the base dusky above; irides dark red; feet lead-colour.

Ceylon.

141. GARRULAX CINEREIFRONS, Blyth.

Peculiar to Ceylon. This species is confined to the southern half of the island, frequenting the lower hills, and, according to Layard, "it much resembles the *Malacocerci*, hunting in small parties and incessantly calling to each other." It is not uncommon in the Kandy district and in the hilly country between that and Galle. I have examined a great number of specimens of this species, and have found them agree very closely with each other; but they differ so materially in dimensions from those given by Blyth that I can only suppose he had but one example before him, and that an immature bird. This impression is confirmed by the specific name *cinereifrons*, given by him, and agreeing with his description "forehead and cheeks pale ashy;" whereas the birds I have examined have the whole top of the head ashy, that colour often extending over the nape, as well as

the cheeks, which are paler than the rest of the head; chin albescent, becoming rufous on the throat; in other respects the colours agree with Blyth's description. The dimensions of a specimen I obtained at Kandy, and which is not at all unnaturally stretched out, but fairly represents an adult bird, measures fully 10 inches instead of 8·5; the other comparative dimensions are:—wing 4·75, 4·5; tail 4·5, 4; bill to gape 1·3, 1·25; tarsus 1·5, 1·25.

Bill black; irides buff; feet dusky.

Ceylon.

142. MALACOCERCUS STRIATUS, Swains.

A comparison of specimens of *M. striatus* I obtained in Ceylon with *M. malabaricus* in the Calcutta Museum left me in great doubt as to the reason for separating them specifically, and I cannot but think they will ultimately be included under the same name. The depth of the striæ in *M. striatus* varies with age; in a well-grown young bird there is not a trace of striæ on the tertiaries, and they are very indistinct on the tail. In a fully adult bird now before me the striation exactly agrees with Jerdon's description of that character in *M. malabaricus*: "the tertiaries are but very obscurely striated, but the tail is distinctly so." The distinctive character of *M. striatus* has hitherto been shown by comparing it with *M. terricolor*; but it should have been placed by the side of the Malabar species.

The Ceylon bird is universally distributed over the low country, frequenting alike the jungle, half-cultivated ground, and the gardens and compounds in Colombo. Its manners are the same as those of the common Indian species. I have found it nesting at Aripo in January.

Young birds are slightly rufous.

Bill pale yellow; irides pale buff; feet pale yellow.

Ceylon, S. India?

The only record I can find of the occurrence of *M. griseus*, Gmel., in Ceylon is in the 'Appendix' to Kelaart's 'Prodromus Faunæ Zeylanicæ' (p. 45), where, in a report by Mr. Blyth on a collection of Ceylon Mammals, Birds, Reptiles, and Fishes, and, I presume, made to the Asiatic Society of Bengal, the following appears among the list of birds:—

"*Malacocercus griseus* (Lath.), var.—Resembling the species of S. India, except that the head is concolorous with the rest of the upper parts."

I have neither seen nor heard of the true *M. griseus* in Ceylon.

143. LAYARDIA RUFESCENS, Blyth.

Peculiar to Ceylon, and tolerably common in the wilder parts of the low country in the southern half of the island. It was formerly considered a hill species; but I believe it only visits the upper hills during the cold season. I have only found it at Nuwara Eliya at the beginning of the year; but it is at all times to be met with a few miles from Colombo where there is jungly or half-cultivated land.

It keeps in small parties, and has generally the habits of the other *Malacocerci*.

Bill dull orange; irides white; feet yellow.

Ceylon.

144. HYPSIPETES GANEESA, Sykes.

As *H. neilgherriensis*, Jerdon, is now united with *H. ganeesa*, Sykes, the Ceylon birds will come under the latter title.

This species in Ceylon is, I believe, confined to the hills, and is most abundant at a moderate elevation. I have only seen it at Nuwara Eliya in February; but it is tolerably common in jungle from the Kandy country to about 5000 feet. I have generally found it in small parties on rather low trees.

Ceylon, S. India.

145. CRINIGER ICTERICUS, Strickland.

Layard says of this bird that it "abounds in the mountain zone." This probably means the lower ranges, as he tells me he has never visited the Nuwara-Eliya district, and he does not profess to know the hill birds. Kelaart, on the other hand, who specially collected the birds of the upper hills, says it is "a common species in the low country." I have no doubt Layard was right in suggesting that Kelaart mistook the common *Ixos luteolus* for this species; and this is confirmed by Mr. Legge's observation that *Criniger ictericus* "is strictly a jungle bird" (J. R. A. S., Ceylon Branch, 1870–71, p. 43). Mr. Legge, however, whose knowledge of the low country at the time he wrote was confined to the western province, says "Kelaart wrote correctly of this bird;" but "a strictly jungle bird" can hardly be described as common in a district principally consisting of paddy-fields and cultivated land.

I have only obtained this bird once in the neighbourhood of Colombo, among trees in a native village; it is most numerous in forest country on the lower hills, as is the case with this species in India.

Bill black; irides red; feet dark leaden.

Ceylon, Malabar.

146. IXOS LUTEOLUS, Less.

This bird, the *Pycnonotus flavirictus* of Strickland, is one of the commonest species in the low country. It is equally abundant at Aripo and Colombo wherever there are low bushes, and has a hurried twittering song of a few notes, loud and frequently repeated.

Bill black; irides red; feet blue-black.

Ceylon, South and Central India.

147. KELAARTIA PENICILLATA, Blyth.

Very abundant at Nuwara Eliya and on the upper hills, frequenting low bushes and thin jungle.

The general colour of this bird is dark olive-green above and greenish yellow below, brighter yellow on the throat, middle of

abdomen, and under tail-coverts; head black in front and shading into olive-green at the nape, with the feathers tipped paler or white; chin and a narrow vertical stripe on each side of the forehead white; lores and cheeks black, paling to leaden grey behind, with a yellow spot below the ear and a tuft of bright yellow feathers springing from immediately behind the eye and directed backwards. These tufts stand out from the sides of the head when the bird is alive, and add much to its generally handsome appearance.

This species was described from Ceylon specimens; but is believed by Jerdon to be "identical with one procured from the Mysore country below the Neilgherries, which was accidentally destroyed," but from which a coloured sketch was made.

Bill black; irides red-brown; feet leaden.

Ceylon, S. India?

148. Rubigula melanictera, Gmel.

Peculiar to Ceylon, and tolerably common in the low country and lower hills of the central and southern portions of the island. I have obtained specimens near Colombo and close to Kandy.

The colour of the upper surface is olive-brown, and of the under parts bright yellow, with the flanks tinged with dull olive; top and sides of the head black; quills brownish black, with the outer edge olive, and tail dingy black, with all but the central feathers tipped white.

Bill black; irides red; feet purplish black.

Ceylon.

149. Pycnonotus hæmorrhous, Gmel.

Very common all over the low country, and less so on the lower hills. I have never seen it at Nuwara Eliya or above 5000 feet, and I am inclined to think it is only a seasonal visitor to that elevation. I have found this species breeding in December at Aripo; its cup-shaped nest was placed under the eaves of my bath-house out of doors, and supported by the sticks of which the rough framework was constructed.

Bill black; irides dark brown; feet leaden black.

Ceylon, South and Central India.

150. Phyllornis jerdoni, Blyth.

Common in the low country. I have obtained it on several occasions at Aripo, near Colombo, and quite in the south. It generally keeps among the upper branches of the trees.

Bill slate; irides brown; feet lavender.

Ceylon, India.

151. Phyllornis malabaricus, Lath.

Recorded by Layard and Kelaart from the hills; and I have seen a specimen obtained by Mr. Laurie. I believe it is rather rare in Ceylon.

Ceylon, South and Central India.

152. IORA ZEYLONICA, Gmel.

This species is well known in the low country; it is very abundant at Aripo at all seasons, and almost as common about Colombo. It breeds at Aripo at the end of the year; and I have obtained it in November with hardly a trace of green on the black back. Its notes are very much varied; and some of them sound as if uttered at a considerable distance when the bird is really within a few yards.

I regret that I did not know whilst I was in Ceylon of the question as to *I. typhia*, Linn., being found in the south of India and Ceylon. As I brought home no male specimens of *Iora* which were not in such a state of plumage as to leave a doubt about their belonging to *I. zeylonica*, I shall not include *I. typhia* among the Ceylon species; but I have a very strong impression, partly based on my recollection of a pair of birds with dull green backs which for several days frequented some shrubs close to a house where I was staying, a few miles from Colombo, that *I. typhia* is found in Ceylon. I had no doubt of it at the time, as the male of *I. zeylonica* should then (February), according to my observations, have the back nearly or entirely black.

In case this paper should fall into the hands of any one collecting in Ceylon, but who is not familiar wlth the distinctive characters of the two species of *Iora*, I may mention that the females are at all times practically alike. In the breeding-season the male of *I. zeylonica* has the back entirely black or, more frequently, black and green irregularly mixed, the colours being in patches and not generally blending with each other; at the same season the male of *I. typhia* has the back wholly green, contrasting with the black wings, which in both species have two white bars. A further distinction is said to exist in the colour of the irides (this would hold good at all seasons), those of *I. zeylonica* being grey and those of *I. typhia* light hazel; I can answer for the former being correct.

Bill slate; irides grey; feet dull leaden.

Ceylon, S. India.

153. IRENA PUELLA, Latham.

Layard and Kelaart have each recorded an example of this species, both from near Kandy.

Specimens of this bird from Ceylon are much desired for comparison with those from India. The male has the whole upper parts and under tail-coverts bright cobalt-blue; wings, tail, and lower plumage deep velvet-black. The female is of a dull, slightly mottled Antwerp blue throughout. (*Jerdon.*)

Ceylon, Malabar, Assam, Arracan, Burmah.

154. ORIOLUS INDICUS, Jerd.

I include this species of Oriole on the authority of Layard, who speaks of a pair of these birds having been shot near Colombo, and coming under his notice.

Ceylon, India.

155. ORIOLUS CEYLONENSIS, Bonaparte.

Generally distributed in the low country. I have met with it commonly at Aripo, Colombo, and in the south; but I have no reason to think it ascends above the lower hills. The young bird has the back pale dirty yellow, purer on the rump; top of the head brownish black, becoming streaked on the cheeks and strongly so on the throat and under neck; quills margined externally with whitish, and the colours generally very much less pure than in the adult. The bill in the young is black.

Bill deep flesh-colour; irides red; feet leaden.

Ceylon, S. India.

156. COPSYCHUS SAULARIS, Linn.

Abundant in the low country, and rarely found far from native villages or the houses of English residents. The familiarity of the "Magpie Robin" makes it a general favourite; and whether when perching on the roof of the house (a frequent station for it when singing) or furiously attacking some intruding rival, there is always something attractive in this showy and well-known species. During the last hour before sunset these birds become very noisy and frequent fights take place between the cocks, two or three of them going through a sort of tournament before the hen bird which has taken up her quarters in the neighbourhood. It is at this time the cocks put themselves in such strange attitudes, turning back the tail till it almost touches the head, as Layard mentions; but Jerdon says he has never observed these performances, which from my own observation I should say are regularly gone through every afternoon; the birds frequently utter a harsh kind of scream; and this goes on until the sun disappears and the quickly following darkness puts an end to the proceedings.

Good specimens of this Robin are very difficult to obtain at Colombo, unless immediately after moulting; as the birds soon become discoloured with the red soil, and the tails rapidly worn out at the end.

Females of this species from Ceylon have the back darker than those from Burmah, and perhaps from India generally, but they do not differ from a Madras specimen in the British Museum.

The young birds are greyish brown above, with the throat and breast mottled with dark brown on a paler ground, and the bill dusky.

Bill black; irides brown; feet dark leaden.

Ceylon, India, Arracan, Tenasserim, S. China, Hainan.

157. KITTACINCLA MACRURA, Gmel.

This bird is confined to wild jungly districts in the low country and on the lower hills. In such localities it is numerous and its fine song may be constantly heard in the morning and evening. It is abundant in the wilder parts of the northern road from Kandy; and I have also heard it occasionally in a piece of thick jungle close to

Kandy itself. It usually perches low; and from its habit of frequenting dense jungle, it is often difficult to obtain sight of.

Bill black; irides brown; feet flesh-colour.

Ceylon, India, Assam, Burmah, Malacca, Hainan.

158. THAMNOBIA FULICATA, Linn.

Common about houses and outbuildings, and, I believe, generally distributed through the lower parts of the country. I have seen them more numerous in the north than elsewhere; and they were always about my house at Aripo, frequently coming into the veranda, and generally very tame.

Bill black; irides brown; feet black.

Ceylon, S. India.

159. PRATINCOLA CAPRATA, Linn.

Layard and Kelaart both mention having obtained this species on the lower hills; but I have never met with it, either alive or as a skin.

Ceylon, India, Burmah, Malaya, Philippines.

160. PRATINCOLA ATRATA, Blyth.

Very common at Nuwara Eliya and on the upper hills. It frequents gardens rather than jungle; and the top of a rhododendron bush is a favourite station for the male, which always chooses a conspicuous position when it sings its short Robin-like song. Young males at first have the general brown plumage and rufous rump of the female; the change to the pure black and white of the adult male is very gradual, the quills and rump being the last to assume the mature colours.

Bill black; irides brown; feet black.

Ceylon hills, Neilgherries.

161. LARVIVORA CYANA, Hodgson.

This bird is a winter visitor to Ceylon. Layard obtained specimens in October in the extreme north; and I procured adult and immature examples of both sexes at Nuwara Eliya in January, February, and March. It was at that time tolerably common on the hills; but I have not met with it at any other season.

The female is olive-brown above; underparts rufous, paler on the throat and centre of abdomen; under tail-coverts white. These particulars, taken from one of my Ceylon specimens, agree with Hodgson's last description of the colours in the female.

Bill dusky; irides brown; feet flesh-colour.

Ceylon, India (generally on the hills).

162. CYANECULA SUECICA, Linn.

Layard obtained this species in March in one of the coffee-districts. I have not met with it.

Ceylon, India, N. and W. Asia, N. Europe.

163. ACROCEPHALUS DUMETORUM, Blyth.

This is apparently the bird given by Layard as *Phyllopneuste montanus*, Blyth.

Generally distributed; it is a winter visitor and numerous in Ceylon at that season. I have killed it at Aripo, Colombo, and Nuwara Eliya. All my specimens have the greenish shade on the upper surface mentioned by Blyth as found in the birds from Ceylon.

Bill dusky above, pale flesh below; irides brownish yellow; feet in different specimens pale brown to purplish flesh.

Ceylon, India, Nepal, Assam.

164. ORTHOTOMUS LONGICAUDA, Gmel.

Common in all parts of the island, but especially frequenting gardens and the neighbourhood of habitations. It is as abundant at Nuwara Eliya as at Aripo or other parts of the low country. I have examined many of these birds from different localities, and have found them to agree in all respects with Jerdon's description of this species, except in the length of the tail; this in Ceylon birds I have never found to exceed $2\frac{1}{4}$ inches.

Bill dusky flesh; irides yellow; feet flesh.

Ceylon, India to Burmah, S. China.

165. PRINIA SOCIALIS, Sykes.

Layard found this species in the extreme north; and I believe Mr. Legge discovered it nesting in a patch of Guinea grass close to his house at Colombo. It will probably be found in suitable situations in other parts of the island.

Ceylon, S. India.

166. CISTICOLA SCHŒNICOLA, Bonap.

Cisticola homalura, Blyth?

I place these two species together as it is difficult to speak of them separately, in consequence of the confusion existing between them, if they are really distinct. Layard says of "*C. cursitans*, Blyth" (? = *C. schœnicola*, Bonap.) that it "is much less common than *C. homalura*; and though found in the same locality, it frequents trees and jungle." This bird surely cannot be a *Cisticola*. Kelaart says of *C. cursitans*:—"frequents the grass-plains; very common at Trincomalie." I can confirm this statement and say precisely the same of it at Colombo; it is common there wherever there is a patch of long grass.

C. homalura was discovered by Layard in paddy-fields near Galle; he "subsequently found it sparingly about Colombo, and abundantly in fields of gingelle (*Sesamum orientale*) at Pt. Pedro." Kelaart says it "is found in great abundance on Horton Plains and Nuwera Ellia," these last localities resembling each other in being elevated grass-plains surrounded by forest-jungle.

I am almost ashamed to think of the number of specimens of *Cisticola* I have shot at Nuwara Eliya in the hope of getting one of

C. homalura, which Blyth says ('Ibis,' 1867, p. 302) "differs from *C. schœnicola* in having a stouter bill, the whole upper parts much darker, and the tail almost even, except that its outermost feathers are ·25 inch shorter than the next;" but, except in some considerable variation occasionally in the depth of the general rufous tint, there was nothing to distinguish them from the grass-frequenting species at Colombo. Mr. Layard tells me that the fine collection of Ceylon birds he brought to England is now in such a state as to be useless for scientific purposes; and as I can obtain no specimens of *C. homalura* for examination, I must regard that species as very doubtful until further evidence is procured from the localities whence Layard obtained his birds.

C. schœnicola from Ceylon agrees with the European bird in size, and is larger than the Indian representative; it has, however, the same decided markings as the latter form, and they are even more conspicuous. The dimensions given by Jerdon are greater than those of any of the Indian specimens I have examined.

Bill dusky above, flesh below; irides pale yellow; feet flesh-colour.

Ceylon, India to Europe, Africa, China, Hainan, Formosa.

167. DRYMOIPUS INORNATUS, Sykes.

The difficulty in determining the species of *Drymoipus* is so well known that it may prevent additional confusion if I mention that the three species included in this list of Ceylon birds have been compared with specimens in the British Museum, and satisfactorily identified with the species there labelled with the names I have given. The identification of at least one of the two Colombo species by myself and Mr. Legge whilst I was in Ceylon was not correct; and it is uncertain to which of them Mr. Legge's observations (J. R. A. S., C. B., 1870–71, p. 50) refer.

I believe *D. inornatus* is not uncommon about Colombo; but the only specimen I brought to England came from Kandy, and agreed with those in the British Museum in having the lores, throat, and cheeks whitish, the whole under surface and flanks very light, with a dull yellowish tinge, and a rather broad subterminal dusky band of uniform tint on the under surface of the tail-feathers. The bill is rather slight and black, with the base of the under mandible abruptly pale (dried skin). The wing exactly 2 inches. Jerdon says of this species, "in no case does the wing ever come up to 2 inches, more generally $1\frac{3}{4}$." I cannot think, however, there is any doubt about this specimen being *D. inornatus*. Layard says the eggs of this species are "verditer, with purplish blotches and wavy lines;" Mr. Legge gives "ground-colour clear blue-green, clouded here and there, or blotched mostly towards the obtuse end, with sepia." It is doubtful to which species either of these gentlemen refers.

168. DRYMOIPUS JERDONI, Blyth.

The common Ceylon species, of which I have obtained specimens close to Colombo, agrees perfectly with *D. jerdoni*, Blyth, in

the British Museum, where there is a specimen named and sent by Dr. Jerdon himself. In the 'Birds of India,' vol. ii. p. 180, Jerdon mentions that Blyth described this species from specimens he sent him from Southern India; but he afterwards absorbed it into *D. longicaudatus* in the belief that the specimen he described was in imperfect plumage. Jerdon further says:—"It appears to me very similar to some Ceylon birds which Mr. Blyth doubtfully considered identical with *D. inornatus*."

My Ceylon birds are greyish brown on the upper surface, rather paler on the head, cheeks, and neck; lores pale and much less conspicuous than in *D. inornatus*; under surface pale fulvous, and flanks rather dusky; the upper surface of the tail-feathers distinctly striated, the striæ showing as faint narrow bars on the under surface, which has a narrow dark subterminal band, generally darker in the centre, and giving the appearance of a spot. In fresh specimens the bill is dusky above, fleshy below; irides pale yellow; feet flesh-colour.

Length 5·5 inches, wing 2·3, tail 2·5, tarsus ·8, bill at front ·4.

Ceylon, S. India.

169. Drymoipus validus, Blyth.

This species, at first called *D. robustus* by Blyth, is peculiar to Ceylon, and, according to Layard (who discovered it), rather a rare bird. Mr. Legge and I were both mistaken in believing it common about Colombo, as I now find I did not see the species in Ceylon. A specimen in Lord Walden's collection, agreeing with another in the British Museum, has the bill entirely black, stouter and considerably deeper than I have seen in any other Ceylon species; top of the head, lores, and general upper surface dark greyish brown; beneath whitish, with a pale fulvous tinge; cheeks, sides of the breast, and flanks dusky. Length 6 inches, wing 2·4, tarsus 1, bill at front ·5.

The dry specimen has the bill black; tarsus yellow-brown (probably flesh-colour when alive); irides "light red-brown" (*Layard*).

Ceylon.

170. Phylloscopus nitidus, Lath.

This bird is common at Nuwara Eliya in the cold season; and I have seen it also at Aripo.

Bill dusky above, flesh below; irides dark brown; feet pale brown.

Ceylon, India.

171. Phylloscopus viridanus, Blyth.

Recorded by Layard, who also gives *Phyllopneuste montanus*, Blyth, which is probably a synonym of *Acrocephalus dumetorum*, Blyth.

172. Sylvia affinis, Blyth.

I obtained one specimen of this species at Aripo in December. Layard also appears to have only met with it on one occasion.

Bill, base slate, tip dusky; irides pale yellow; feet dark leaden. In this species and very many others Jerdon has apparently given

the colour of the bill and legs from their appearance in dried specimens.

Ceylon, Central India.

173. MOTACILLA MADERASPATENSIS, Gmel.

Layard mentions having seen one specimen in a private collection in Ceylon.

Ceylon, India.

174. CALOBATES SULPHUREA, Bechst.

I have obtained this bird at Nuwara Eliya in the beginning of the cold season; it is better known on the hills than in the low country.

Asia to Australia, Africa, Europe.

175. BUDYTES VIRIDIS, Gmel.

This is the common Wagtail in Ceylon, appearing with other migratory birds in October.

Ceylon, India, "N. Africa, S.E. Europe, and W. Asia" (*Jerdon*).

176. LIMONIDROMUS INDICUS, Gmel.

I have only seen this bird on wild jungle-roads between Kandy and Trincomalie; but Layard has apparently met with it in other localities.

Ceylon, India, Arracan, Burmah, and part of Malaya, China.

177. CORYDALLA RICHARDI, Vieill.

This species is numerous in winter on the "Galle face"—the esplanade at Colombo, and a great place of resort for Pipits, Wagtails, and small Sand-Plovers at that season. It is no doubt, as Layard states, widely distributed; but I do not think it is a resident in Ceylon.

Ceylon, India, and Asia generally, Africa, Europe.

178. CORYDALLA RUFULA, Vieill.

Resident and very common in Ceylon; I have found it at Aripo, Colombo, and Nuwara Eliya; and I believe it is generally distributed throughout the island.

Bill dark brown above, yellowish below; irides brown; feet light fleshy brown.

Ceylon, India, Assam, Burmah.

179. CORYDALLA STRIOLATA, Blyth.

This bird is also common at Colombo in the winter. I have compared and identified specimens of this and *C. richardi* from Ceylon with birds in the Indian Museum at Calcutta.

Ceylon, India, China.

180. ZOSTEROPS PALPEBROSUS, Temm. (Plate XX. fig. 1.)

Common in the central and southern parts of Ceylon, but only ascending the hills to about 2000 feet. It frequents trees and

flowering shrubs, and, Mr. Legge says, is often to be seen on the tulip-trees in the principal street of the Fort at Colombo. It is common about Kandy and the surrounding district; but I have never met with it in the north or on the upper hills. Specimens of this *Zosterops* from the low country in Ceylon vary somewhat in size, but have been identified in England and Calcutta with *Z. palpebrosus*, and agree with Jerdon's description of that species except in being generally smaller and in the colour of the bill and legs. He says, "Bill blackish, horny at the base beneath; legs reddish horny;" but I find in freshly-killed birds the following colours:—

Bill dark leaden, paler at the base beneath; irides light brown; legs and feet lavender.

Ceylon, India, Assam, Arracan, Tenasserim.

181. ZOSTEROPS CEYLONENSIS, n. sp. (Plate XX. fig. 2.)

Upper surface dark olive-green, deeper on the head and paler on the upper tail-coverts; a circle of small white feathers round the eye; lores and below the eye dusky, but not very conspicuous; chin, throat, and centre of breast greenish yellow, shading at the sides of the neck and breast into the colour of the back, and giving the appearance of an incomplete pectoral band; the rest of the underparts bluish white, darkest on the flanks, and sometimes tinged in the centre with yellow; under tail-coverts yellow; quills and tail dusky brown, both margined externally with olive-green, and the latter faintly marked with transverse striæ. Sexes alike.

Length 4·75 inches, wing 2·4, tail 1·8, bill at front ·5, tarsus ·7.

Bill dark leaden above, paler below; irides light brown; feet lavender.

This is at all seasons one of the commonest birds at Nuwara Eliya and on the upper hills. It is, I have no doubt, the one recorded by Kelaart as *Z. annulosus*, Swainson, an African species. Layard, in speaking of this bird in his 'Notes on the Ornithology of Ceylon,' says: "Dr. Kelaart writes, 'we fear that the Nuwara Eliya *Zosterops* is wrongly identified; it is of a darker green than the common *Z. palpebrosus*.'" He then adds, "I, however, much doubt the distinctness of this and the preceding species." A comparison of the two birds, however, leaves no doubt that there is a marked difference between them, both in colour and in the form of the bill. The bird from the Ceylon hills cannot be identified with any recognized species; and Mr. A. O. Hume, to whom I showed specimens of it when I was at Calcutta, told me he had never seen it in any of his many collections from the Neilgherries, a district (as I have before mentioned) agreeing closely in character and productions with the Ceylon hills. Mr. W. T. Blanford, in a paper on the Birds of Western India (J. A. S. B. 1869, vol. xxxviii. p. 170), says, in speaking of *Z. palpebrosus*, "the Nilgiri race is a little larger and appears to be a little darker in colour." He gives as the measurements of a specimen, "beak ·4, wing 2·2, tail 1·75, tarsus ·7," and says "the black lores appear more developed in the Nilgiri bird." These observations evidently refer to *Z. palpebrosus*; but it appeared to me desirable to

mention them in my account of *Z. ceylonensis* for the purpose of showing the difference between the hill species of the two countries.

I believe Dr. Jerdon is under the impression that he has seen *Z. ceylonensis* in India; but he has no record of it.

Z. ceylonensis differs somewhat in habits from *Z. palpebrosus*. It frequents hedges and bush-jungle rather than trees, clinging Tit-like to the stems, and often covering its forehead with pollen from the flowers which it busily examines for insects. As these birds are very common and constantly flying in small parties from bush to bush, uttering their lively chirp, they attract attention; and the little "White-eye" is familiar to most Europeans who visit Nuwara Eliya. In the winter the males associate in flocks of fifteen or twenty; and it is then rare to find a female in their company. I believe the latter are for the time solitary, as, with one exception, the numerous specimens I have shot from different flocks have proved to be males. The breeding-season is probably about April or May; but I have been unable to obtain any particulars of their nesting.

The distinction between the two species of *Zosterops* found in Ceylon will be readily seen on reference to Plate XX.

182. PARUS CINEREUS, Vieill.

Very abundant at Nuwara Eliya and on the upper hills at all seasons, and found occasionally on the western coast, around Colombo and not far from Galle. Layard says it is "not uncommon throughout the island," but I have never seen it in the Aripo district or in the extreme south. Like many hill birds it is often met with near Kandy; but I expect its appearance about Colombo and in some other parts of the low country is exceptional, as when found there it is by no means numerous. It has the usual habits of the Titmouse family.

Bill black; irides black; feet leaden.

Ceylon, India (except Bengal), Malaya.

183. CORVUS LEVAILLANTI, Less.

Corvus culminatus, Sykes.

General in the low country, and especially frequenting native villages and the more uncultivated districts in the interior. It is rare at Colombo compared with *C. splendens*, and was not so numerous as that species at Aripo. I believe Crows are unknown on the upper hills; but I have heard of their having been occasionally seen for a a day or two on coffee-estates 3000 or 4000 feet high.

Bill black; irides dark brown; feet black.

Ceylon, India to the Malay peninsula.

184. CORVUS SPLENDENS, Vieill.

This well-known bird is much more numerous on the coast generally than inland, and is found in great abundance in all the large towns, but is not met with in native villages so much as the last species. It was common at Aripo; and at Colombo it is very abundant, not confining itself to the shore, but boarding the vessels as soon as

they are anchored in the harbour or roadstead, paying frequent visits while they remain there, and only reluctantly leaving them at their departure when they are two or three miles away. It is unnecessary to say more of the well-known inquisitive, thievish habits of these birds than that in Ceylon they fully keep up the character they have obtained elsewhere. From the comparative localization of this bird in the larger towns in the south-west of Ceylon, Mr. Hugh Nevill has stated (Journ. Roy. Asiat. Soc., Ceylon Branch, 1870–71, p. 33) that "there is no doubt it is not indigenous to the south of the island, having been introduced by the Dutch at their various stations as a propagator of cinnamon, the seeds of which it rejects uninjured." I have been unable to discover on what evidence this statement has been made. This Crow has certainly been in Ceylon long enough to spread over every part of the island if its habits or inclinations had led it to do so; but on both sides of the island it is comparatively local; and whilst on a coasting voyage from Ceylon to Calcutta, and calling at numerous places on my way, I found on the Indian coast the same localization of this bird in the larger ports as is the case in Ceylon.

The Ceylon birds are smaller than those in India, and, according to Blyth, are darker, but I have not had an opportunity of comparing a sufficient number of specimens from the two countries to be able to judge on this point. Jerdon says nothing of the neck changing from ashy to a dull fawn-colour in old birds in India; but this is the case in Ceylon. The young birds are very dark on the neck; and these may possibly have been the subjects of Blyth's observations. Specimens of this Crow from Ceylon and India are now, however, in the Gardens of the Society, and will afford ready means of comparison of any changes that may take place.

Bill black; irides brown; feet black.

Ceylon, India, Assam, Burmah?

185. Cissa ornata, Wagler.

Peculiar to Ceylon. This remarkably handsome species has attracted some attention since it was described by Blyth as *C. puella* from specimens forwarded by Layard; but it had been previously made known by Wagler. It is, so far as is known, essentially a hill bird, found most abundantly at about 5000 feet and upwards, but at certain seasons descending as low as 1500 feet. This is about the elevation of Kandy; and the jungles in the immediate neighbourhood of that city, nearly in the centre of the island, appear to be the lower limit of the range of this and many other hill species. In the cold season, which is only really perceptible on the hills, these birds are numerous at Nuwara Eliya, frequenting the dense bushes growing under the trees in forest-jungle. They are very noisy, continually uttering a harsh Jay-like scream, both when perched and flying. There is consequently little difficulty in finding them out when they are in the neighbourhood; but from their keeping so much to the dense jungle I have on several occasions worked my way quietly through the bushes to within a few yards of the birds without being

able to get sight of them. The specimens I obtained were apparently not quite mature, as the blue of the underparts was not uniformly developed; otherwise they were in good feather, and enable me to give a description of the species.

Whole head and neck rich deep chestnut; back, tail, and underparts (in adults) bright cobalt-blue, the tail-feathers tipped and more or less margined externally with white; quills light chestnut on the outer webs, black on the inner.

Bill red (adult), tipped black (young); irides light brown; feet coral-red.

Ceylon hills.

186. Acridotheres tristis, Linn.

Very common in the low country, and generally distributed. They were very numerous at Aripo; and a young bird brought to me by some natives soon became tame enough to be allowed its liberty in the house, sometimes escaping through the window to the adjoining trees, but always allowing itself to be caught, or going into its cage when held up to it. It became rather troublesome at last from its fondness for standing on the top of my head or perching on my hand when I was writing or engaged in some other work at the table.

Ceylon specimens are much darker than those obtained in India.

Bill yellow; orbits yellow; irides dark brown; feet pale yellow.

Ceylon, India, Assam, Burmah.

187. Temenuchus pagodarum, Gmel.

Obtained by Layard in the north of the island, and by Kelaart at Trincomalie.

Ceylon, India.

188. Temenuchus senex, Temm.

Peculiar to Ceylon; described by Layard as *T. albofrontatus*, as it was believed to be new; it has since been recognized as *T. senex*, Temm., erroneously described by Bonaparte as from Bengal Several specimens have been received by Lord Walden, of which, however, only one has the head entirely grey, the true character of *T. senex*. Layard gives the following description of his bird, which is now in the British Museum:—

"General colour of back, tail, and wings black with a green gloss; forehead albescent; hinder feathers of crest brownish black with albescent shafts; general colour of breast, throat, vent, and under tail-coverts albescent, the shafts of the feathers on the throat shining white."

It is, I believe, from the lower hills, and appears to be rather a local species.

Ceylon.

189. Pastor roseus, Linn.

Layard "found large flocks of these birds" quite at the north of the island in July, but did not see them afterwards. They have also

been obtained at Putlam, on the west coast; and I have little doubt that I saw a flock at Aripo in 1866, but I could not get near them. It is rather remarkable that this bird is not better known in Ceylon, as in India, according to Jerdon, it is most abundant in the south and south-west.

Ceylon and India westward.

190. EULABES RELIGIOSA, Linn.

Recorded by Layard as common on the west coast. I have never met with it at Aripo, and believe it is more frequently seen in the south. There are many Ceylon specimens in Lord Walden's collection, most probably procured in the south-east of the island.

Ceylon, South India.

191. EULABES PTILOGENYS, Blyth.

This well-marked species of hill Myna is peculiar to Ceylon, and is found in flocks on the upper hills chiefly, but sometimes met with in the neighbourhood of Kandy. It frequents the tops of the trees; and at Nuwara Eliya, where it is often numerous, I have found it wild and difficult of approach. I have heard, however, of large numbers having been killed on some of the coffee-estates in the early morning or evening. Its call is constantly repeated when on the wing, and sometimes when perched on the tops of the trees.

This species may be readily distinguished by the yellow lappets at the back of the head, and the absence of any naked skin about the eye and cheeks.

Bill deep orange, base black; irides brown, lappets yellow; feet dull yellow.

Ceylon.

192. PLOCEUS BAYA, Blyth.

This bird, called by Layard *P. philippinus*, is said by him to be migratory and to breed in June. It was, however, generally to be found at Aripo; and there they used to build their curious nests in December on the trees close to my house. A young bird was brought to me in February which was just ready to leave the nest. I have never seen the nest of this species in any other than ordinary branching trees; but Layard says it builds on palms and other trees indiscriminately.

Ceylon, India, Assam, Burmah, Malaya.

193. PLOCEUS STRIATUS, Blyth.

I have not met with this species at Aripo or on the west side of Ceylon; and Layard, who found it on the east side, thinks it is confined to that part of the island. It is rather remarkable, however, that this bird should not change its quarters according to the season and, like many other species, migrate from one side to the other at the change of the monsoons.

This is the species most probably given by Layard under *P. manyar*, Horsf., which is a Javan bird.

Ceylon, North and Central India, Burmah, parts of Malaya.

194. MUNIA MALACCA, Linn.

195. MUNIA RUBRONIGRA, Hodgs.

196. MUNIA UNDULATA, Latham.

197. MUNIA STRIATA, Linn.

198. MUNIA MALABARICA, Linn.

With the exception of *M. rubronigra*, which I have not seen, and was recorded by Layard only from Galle, the above species are more or less abundant in the low country—*M. undulata* and *M. malabarica* being the most numerous, and the former perhaps the most widely distributed. I have seen many nests of *M. undulata* at Aripo and near Colombo, and have often watched the birds biting off the grass-stems and taking them to the nest, which has been generally a large structure, sometimes placed near the end of a branch, but more commonly in a thick bush.

These species are more or less distributed through India and the neighbouring countries eastward of it.

199. MUNIA KELAARTI, Blyth.

Peculiar to Ceylon, and confined to the upper hills. It is abundant at Nuwara Eliya at all seasons, frequenting the gardens and cultivated ground, and may often be seen on the roads feeding, like the Sparrows, on what it can find there. I have specimens in all stages of plumage. The adult bird may be distinguished from *M. pectoralis*, Jerdon, with which it was at first confused, by its having the rump and underparts, from the breast downwards, brownish black, with each feather centred, barred, and margined with white, producing a mottled effect; the under tail-coverts are only centred white; and the extremity of the upper tail-coverts is tinged with glistening yellow. Young birds have the throat speckled brown and white, and the underparts faintly mottled with two shades of light yellowish brown.

Bill lead-colour, very dark in adults; irides brown; feet leaden.

Ceylon.

200. ESTRELDA AMANDAVA, Linn.

I have seen specimens of this bird which were procured by Mr. Legge from a grass-field adjoining his house at Colombo. It had not been previously observed in Ceylon; and it may be, as Mr. Legge suggests as possible (J. R. A. S., C. B., 1870–71, p. 53, note), that some of the many birds of this species imported into Ceylon have escaped from confinement and become acclimatized. The occurrence of *Munia rubronigra* (a North-Indian species) only about Galle may perhaps be accounted for in the same manner, if no mistake was made in its identification.

Ceylon, India, Assam, Burmah.

201. PASSER INDICUS, Jard. & Selby.

Found in Ceylon wherever there are human habitations. It is

abundant at Nuwara Eliya, but I was told by old residents that they remembered the time when the now common Sparrows and Musquitos were unknown at that elevation.

Ceylon, India, eastward to Siam.

202. MIRAFRA AFFINIS, Jerdon.

I have found this species common at Aripo; and Layard has recorded it from the north also. I am not sure that it does not also occur at Colombo.

Bill dusky above, pale brown below; irides brown; feet fleshy brown.

Ceylon, South India, Upper Burmah.

203. PYRRHULAUDA GRISEA, Scop.

Confined to the northern part of the island. Layard believed it was migratory; but I have seen it at Aripo at all seasons, in pairs during the summer, and in flocks during the winter months.

Bill pale brown; irides brown; feet fleshy.

Ceylon, India westward to Arabia.

204. ALAUDA GULGULA, Frankl.

Very common in the low country; but I have no recollection of seeing it on the hills. It has, however, been recorded, I believe, from the upper country by Kelaart. It was abundant at Aripo.

Bill dusky above, paler below; irides brown; feet fleshy brown.

Ceylon, India.

205. CROCOPUS CHLOROGASTER, Blyth.

I have obtained this Pigeon near Aripo; and it is said by Layard to be confined to the north of the island.

Ceylon, South and Central India.

206. OSMOTRERON BICINCTA, Jerdon.

This species is also found at times in wild jungle south of Aripo. I have likewise met with it a few miles from Coombo; but it is recorded as more numerous further south.

Ceylon, India eastward to Tenasserim.

207. OSMOTRERON POMPADOURA, Gmel.

The description of this species given by Gmelin was from a drawing of a Ceylon bird. Layard believed it to be a variety of *O. malabarica*, Jerdon; and Blyth has since given it the name of *flavogularis*; but the difference between Blyth's species and *O. pompadoura* can only be traced in the under tail-coverts, and there is a variation in this difference. *O. pompadoura* and *O. flavo-gularis* agree precisely in differing from *O. malabarica* in having the head less grey and the throat more yellow, and in not having the under tail-coverts cinnamon; this colour, however, Mr. Blyth tells me is only found in the male of *O. malabarica*. Specimens of *O. pompa-*

doura and *flavo-gularis* in Lord Walden's collection are undistinguishable, except in having the under tail-coverts green margined with white, entirely white, or white margined with yellow. Lord Walden's opinion that these differences are due to season or age appears to me likely to be correct; if not, the number of species founded on the colour of these particular feathers will have to be increased.

Ceylon, South India.

208. CARPOPHAGA SYLVATICA, Tickell.

Recorded by Layard as mostly found on the mountain-zone. He mentions it under the name of *C. pusilla*, Blyth; but the difference in size of this Pigeon from Ceylon and parts of India is not generally recognized as of specific value.

Ceylon, India to Burmah, and Hainan.

209. ALSOCOMUS PUNICEUS, Tickell.

This Pigeon, known to the Singhalese by a name literally translated "Season Pigeon," is recorded by Layard only as a rare visitor; and, according to the natives, "it appears during the fruiting of the cinnamon-trees." I have never seen it.

Ceylon, Eastern side of Central India, Assam, Arrakan, and Tenasserim.

210. PALUMBUS TORRINGTONIÆ, Kelaart.

Peculiar to Ceylon. It is found in great abundance on the hills, but changes its locality according to the season and the time at which the fruit of particular trees ripens. I have found it numerous at Nuwara Eliya at the end and beginning of the year; and it is occasionally found there at other times. It is allied to *P. elphinstonei*, Sykes, but differs essentially from it in having the back and wings dark slaty, and the underparts strongly vinaceous. It is known on the hills as the "Blue Pigeon."

Bill dusky, tip pale green; irides dark yellow; feet fleshy red.

Ceylon.

Macropygia macroura (Gmelin). With reference to the occurrence of this species in Ceylon, as stated by Bonaparte, Lord Walden has been good enough to send me the following note, with permission to make use of it:—

"The titles *Columba macroura*, Gmel. (1788), and *Columba macerona*, L. S. Müller (1776), were founded on the *Tourocco* of Buffon (Hist. Nat. Ois. ii. p. 553, and Pl. Enl. 329). Buffon figured this Pigeon from a Senegal example, presented by Adanson under the name of *Tourterelle à large queue du Sénégal*. But he afterwards (Hist. Nat.) substituted for Adanson's title that of *Tourocco*, because, as he says, while Adanson's bird possessed many of the characters of the European Turtledove, it carried its tail like 'le Hocco' (*Crax*). *Tourocco* may therefore be translated Turtledove-Curassow. Buffon is most circumstantial in his account of the locality whence his bird was obtained; and the fact that the specimen bore a title given

by Adanson strongly corroborates the Senegal origin. Yet Bonaparte (Consp. ii. p. 57) says 'ex Ceylon, nec Senegal.' The Prince was also (*l. c.*), I believe, the first who referred *C. macroura*, Gm., to the genus *Macropygia*. Still it is doubtful whether he ever saw an example of the bird, and the diagnosis given by him of the species only contains the prominent characters discernible in the plate quoted."

211. Columba intermedia, Strickl.

There are two stations on the Ceylon coast which "Rock-Pigeons" are known to frequent. The principal one is Pigeon Island, a large mass of isolated rocks well known on the east coast, and about eighteen miles north of Trincomalie. I have visited this locality; and I have no doubt that Pigeons, probably of this species, are found there at a particular season of the year, according to the general report of the natives on the adjoining mainland; but I did not see any when I was there. Layard mentions their having been killed about fifty miles inland from Trincomalie. The other station is off Berberyn, not far from Galle.

Ceylon, India to Burmah.

212. Turtur rupicola, Pall.

Layard records having shot a young bird of *T. orientalis*, Lath. This may be the above species; but I am disposed to think his identification doubtful, as his only specimen was a young bird.

213. Turtur suratensis, Gmel.

Very common in the low country, and abundant at Aripo.

Ceylon, India.

214. Turtur risoria, Linn.

Very numerous in the north, and, I believe, not uncommon throughout the low country.

Ceylon, India.

215. Chalcophaps indica, Linn.

This handsome Dove is found in all parts of the island except the north. I have met with it in cultivated districts near Colombo and in the extreme south, on the road through the forest between Kandy and Trincomalie, and at Nuwara Eliya, where at the end of the year it frequents the jungle in great numbers. It has a low rapid flight, and a peculiar moaning coo, more like the note of some Owls than that of a Dove.

Ceylon, India, eastward to Tenasserim.

216. Pavo cristatus, Linn.

Common in all jungly districts within a moderate distance of the coast. So far as my observations and inquiries have gone, it is unknown in the hill-country; and it is more numerous in the eastern

and northern parts of the island than in the more cultivated south and west.

Ceylon, India.

217. GALLUS STANLEYI, Gray.

The Ceylon Jungle-fowl is remarkable not only for being peculiar to the island, but also for being common in all parts of it where the country is uncultivated and there is jungle of a moderate height. Although especially abundant in the low country, it is often very numerous even on the upper hills, and is attracted to the particular localities where the "*nilloo*," the native name for some species of *Strobilanthes* growing at 5000 feet and upwards, is at the time in seed. I have entirely failed to discover that any thing is known among botanists of the seeds of the *Acanthaceæ* possessing narcotic or other poisonous properties; but it is well known that the Jungle-fowl after feeding for a time among the *nilloo* become partially blind or stupified, so that they may frequently be knocked down with a stick. This stupefaction is generally attributed to the *nilloo*-seeds, which are so largely eaten by these birds; but in the absence of any known poisonous properties in these seeds, it appears possible that the birds may really suffer from devouring some fungus or other plant found in the damp woods where the *nilloo* grows.

At daybreak the crow of the Jungle-cock is first heard; and for an hour or two after sunrise, if the birds are at all numerous, they may be heard challenging each other on all sides. On these occasions a successful shot may sometimes be obtained by remaining perfectly still between two birds which are challenging and gradually approaching each other. Some of the native hunters are very expert in calling the Jungle-cocks, by beating on a loose fold of their cloth, so as to produce an imitation of the sound of a bird's wings just as it is alighting: no time must be lost with the gun on these occasions, as the cocks discover the deception the moment they get sight of you, and instantly run off with drooping tails like Pheasants. It is not difficult in favourable jungle to approach a calling bird within easy shot; and under these circumstances I have generally found the cock strutting up and down a low horizontal branch of a tree, raising and lowering its head, and every now and then giving utterance to its peculiar crow, which has been likened to the sound of "George Joyce." When the bird is tolerably close, the syllable "ek" is heard preceding those two sounds, which are so familiar to persons who have been wandering in the jungles of Ceylon. In some of the wilder jungle-roads, a cock and hen may sometimes be seen feeding together; but generally the hens are very shy, and not many of them are killed.

Mr. Layard tells me that there is no doubt about this Jungle-fowl sometimes breeding with the domestic poultry in the native villages. I have seen young Jungle-fowl, which had been hatched under domestic hens, running about with the other chickens; but they were always rather wild and invariably roosted out of doors; and those which were not sooner or later killed by some accident,

ultimately took to the jungle. Some others, which, however, were reared in an aviary at Colombo by my friend Dr. Boake, became quite tame, and were in good feather when he kindly allowed me to send them to London for the Society's Gardens; but they all died when they were almost within sight of England.

Mr. Blyth can hardly be correct in his description of the head and appendages in this species. He says (Ibis, 1867, p. 307), "The cock has a yellow comb with a red edge, and the cheeks and wattles (as I remember them in the living bird) are chiefly yellow." His description of the colour of the comb is approximately correct, as the extent of the yellow varies in different specimens; but I am too familiar with the appearance of the living or freshly killed bird to have any doubt about the cheeks and wattles being red. These parts assume a dark livid appearance a few hours after death; but the yellow in the comb remains, and is evident even in old dry skins. The size of the comb and wattles varies, and probably depends on age.

The following details were taken from a fine adult cock I killed at Aripo, and were noted down on the spot:—

Bill brown, front of the lower mandible pale yellow; irides buff; comb, wattles, and naked skin about the head purplish red, the comb having a large wing-shaped spot of yellow occupying the middle of the posterior half, very bright at its origin immediately over the eye, and shading off at its margin into the colour of the comb; feet and legs pale yellow.

Ceylon.

218. Galloperdix bicalcarata, Forst.

Peculiar to Ceylon; abundant on many parts of the hills, and frequenting also jungly places in the low parts of the southern half of the island. During the winter months it is numerous in the coffee-districts and upper hills, and is trapped in large numbers by the natives. It is skulking in its habits and difficult to flush, usually seeking concealment in the thicker parts of the jungle when it is disturbed. They bear confinement well in Ceylon; but some specimens I brought to England, although apparently strong and well on their arrival, all died within three days after the ship entered the Thames.

Bill red ♂, dusky ♀; irides brown; feet fleshy red.

Ceylon.

219. Francolinus pictus, Jard. & Selby.

The occurrence of this species, said to have been well identified, was noticed three or four years ago in one of the Colombo newspapers. I did not see the specimens, and I cannot now give the precise date or particulars of where they were obtained.

Ceylon, Central India.

220. Ortygornis ponticeriana, Gmel.

Common in the north of Ceylon, and found also in the cinnamon-gardens at Colombo. These birds may have escaped from confine-

ment, as large numbers of them are brought alive to the Colombo market from Tuticorin on the Indian coast; Mr. Legge, however, has also seen the bird at Galle. This species is indigenous in the north, and is always very abundant at Aripo. The large compound surrounding my house at that place was virtually nothing but a considerable piece of jungle fenced in, and was frequented by many kinds of wild animals and birds. Partridges were very numerous there; and they might be seen or heard at all hours of the day, and often within a few yards of the house. They roosted in low bushes.

Bill dusky; irides brown; feet dull red.

Ceylon, South, Central, and North-west India, Persia?

221. PERDICULA ASIATICA, Lath.

Layard mentions having seen a pair of these birds which were caught alive near Colombo. He speaks of it under the name of *P. argoondah*, Sykes.

Ceylon, South India.

222. EXCALFACTORIA CHINENSIS, Linn.

I have seen this bird from Kandy and the cinnamon-gardens at Colombo; and Layard says it is common in the south.

Ceylon, India, eastward to China, Malaya, Australia.

223. TURNIX TAIGOOR, Sykes.

Common in all parts of the low country. I have found its eggs at Aripo in February.

Bill lead-colour; irides pale yellow; feet pale leaden.

Ceylon, India.

224. CURSORIUS COROMANDELICUS, Gmel.

I believe the Indian Courser is resident in the north of Ceylon, as I have seen it in almost every month of the year at Aripo. It is more numerous, however, in the winter months, being then in small parties of six or eight. Its flight is heavy and flapping, like that of the Lapwings; but it runs lightly and fast; and when separated from its companions, I have more than once seen it running along behind the bund of a dry paddy-field, with head lowered and wings trailing on the ground, presenting a most curious appearance, as the colour of the back resembled that of the dry mud, and there was nothing to attract attention but the drooping black primaries. Layard appears to have occasionally met with this bird, but only in April.

Bill black; irides dark brown; feet cream-colour.

Ceylon, Central and West India.

225. CHARADRIUS FULVUS, Gmel.

Charadrius longipes, Temm., apud Jerdon.

The Ceylon birds have the ash-coloured axillary plume characteristic of this species; they are migratory, appearing at Aripo in August, many of them then having some remains of the black

breeding-plumage. Throughout the winter they are abundant in the north, and are occasionally seen as far south as Colombo, frequenting the esplanade with some of the smaller Plovers.

Bill black; irides brown; feet dark leaden.

Ceylon, India, Eastern Asia to Australia, and Polynesia.

226. ÆGIALITES MONGOLICUS, Pall.

Mr. Edmund Harting, in a series of exhaustive papers "On rare or little known Limicolæ" ('Ibis' 1870), has worked out the synonymy of this species, among others, and identified the bird given by Jerdon under *Æ. pyrrhothorax*, Temm., with that described by Pallas. It is doubtless the one mentioned by Layard as *Hiaticula leschenaultii*, Less., as I have no reason to think the much larger *Æ. geoffroyii*, Wagler, is found in Ceylon.

Æ. mongolicus is a winter visitor to Ceylon, and is then very abundant on the coast, commonly associating with *Æ. cantianus*. All the specimens I have examined have been in winter dress.

Bill black; irides dark brown; legs grey, feet dark grey.

Asia to North Australia.

227. ÆGIALITES CANTIANUS, Lath.

Mr. Harting has been good enough to examine my specimens of this and the preceding species, and he tells me that a small Plover which I had been unable to identify is the young of *Æ. cantianus*. I obtained specimens of this species in different states of plumage; but the greater number of these birds found in Ceylon are young ones, and apparently diminutives of *Æ. mongolicus*. I have occasionally got specimens in nearly, if not quite, full plumage.

Bill black; irides dark brown; feet dark grey, legs paler (in the young).

Europe, Asia.

228. ÆGIALITES DUBIUS, Scop.

Ægialites philippensis, Scop., apud Jerdon.

This well-known little Plover is common in Ceylon, and, I believe, resident there, as it is certainly found during a great part of the year at Aripo. Although associating to some extent with the other Sand-Plovers, it does not always keep with the party, but wanders off to some distance when feeding. It is particularly fond of standing on any little natural elevation of the ground or heap of rubbish on the beach.

Bill black; irides dark brown; feet yellow.

Ceylon, India, eastward to China and Japan.

229. CHETTUSIA GREGARIA, Pall.

I have identified a single specimen of this Plover shot by Mr. Bligh on the Galle face at Colombo. It has not been before observed in Ceylon.

Ceylon, parts of India, West Asia, and South-east Europe.

230. LOBIVANELLUS INDICUS, Bodd.

Lobivanellus goensis, Gmel., apud Jerdon.

Found in all open parts of the low country, and generally in pairs. Resident in Ceylon.

Ceylon, India.

231. SARCIOPHORUS MALABARICUS, Bodd.

Sarciophorus bilobus, Gmel., apud Jerdon.

Distribution much the same as that of the last species, but it is more numerous in the north. It was always abundant at Aripo, and was found in large flocks during winter. Jerdon, in his description of this species, has omitted to mention that the chin and upper part of the throat are dull black. This appears as soon as the young are well able to fly, and remains at all seasons. It is present in all the Indian specimens I have seen.

Bill yellow, tip black; irides pale yellow; wattles yellow; feet yellow.

Ceylon, India.

232. ESACUS RECURVIROSTRIS, Cuv.

I have only seen this bird occasionally in the Aripo district. It was usually in pairs on the banks of the Aripo river. I have shot this bird in August, from which it would appear to be a resident.

Bill greenish yellow, tip black; irides pale yellow; feet yellow.

Ceylon, India.

233. ŒDICNEMUS CREPITANS, Temm.

Common in the north at all seasons. I have also flushed it in the cinnamon-gardens at Colombo.

Asia, N. Africa, Europe.

234. STREPSILAS INTERPRES, Linn.

I obtained one specimen in August on the coast a few miles north of Aripo. Layard also met with it in the north, and once at Colombo. It is rather a scarce bird in Ceylon.

World-wide distribution.

235. DROMAS ARDEOLA, Paykul.

I have never seen this remarkable bird; but specimens were obtained by Layard—at sea, with one exception. He follows Blyth in placing it near the Terns.

Ceylon, India, Red Sea.

236. HÆMATOPUS OSTRALEGUS, Linn.

Layard records having seen one or two of these birds near Jaffna.

Ceylon, Indian and European coasts.

237. SCOLOPAX RUSTICULA, Linn.

The occasional appearance of the Woodcock on the Ceylon hills

has been reported on "sportsman's authority;" and it is now confirmed by Mr. S. Bligh, who writes to me that he has just examined a specimen quite recently killed at Nuwara Eliya.

238. GALLINAGO NEMORICOLA, Hodgson.

239. GALLINAGO STENURA, Temm.

240. GALLINAGO SCOLOPACINA, Bonap.

241. GALLINAGO GALLINULA, Linn.

Of these four reputed Ceylon species *G. stenura* appears to be the only one which has been positively identified. It is the Common Snipe of sportsmen; and I believe there are but few persons in the island who are aware of the peculiarity in the tail-feathers by which it can be at once distinguished from *G. scolopacina*, which it is generally believed to be. *G. stenura* is found all over the island in the winter months; and although of course much more abundant in paddy-growing districts, it is also numerous in swampy plains on the upper hills. *G. nemoricola* was recorded from Nuwara Eliya by Mr. Hugh Nevill as new to the island (J. R. A. S., C. B., 1867–70, p. 138); but although he, I believe, examined the specimen, the skin was not preserved, and he himself told me that he identified the bird, after he had left the hills, by the coloured figure in Jerdon's 'Illust. Ind. Ornith.,' from which work he has evidently taken his description of the species. Although neither Layard nor Kelaart mentions this bird, Jerdon speaks of it as being found on the "elevated regions of Southern India and Ceylon," but does not give any authority. In the case of *G. gallinula*, Layard thought that "sportsman's authority" might be trusted, as the "Jack" would not be easily confounded with the other Indian Snipes, and he had been informed by a person likely to be acquainted with it that it was not uncommon in the north a few years previously. None of these species is unlikely to occur in Ceylon; but, except in the case of *G. stenura*, the evidence in their favour is not quite as clear as could be wished.

242. RHYNCHÆA BENGALENSIS, Linn.

Not uncommon in the low country during the winter. Layard says some remain to breed, "the season of incubation being from May to July." He tells me that he obtained many eggs of this species. Jerdon also gives June and July as the breeding-time of this bird in India. It apparently varies, however, as a bird caught near Colombo, and sent alive to me on the 31st of December, was found to have laid an egg in the basket in which it was packed. This egg has been identified by Mr. Layard as that of the Painted Snipe, although its ground-colour is rather paler than usual.

Ceylon, India, Burmah to S. China, Africa.

243. LIMOSA ÆGOCEPHALA, Linn.

Recorded by Layard. I have not met with it.

Ceylon, parts of continental Asia and Europe.

244. TEREKIA CINEREA, Gmel.

I obtained one specimen in winter plumage, out of a flock of five, in April 1869; they were in a small swamp near the sea at Aripo. It appears to be new to Ceylon.

Bill dusky, base yellow; irides brown; feet pale orange.

Europe, Asia to Australia.

245. NUMENIUS ARQUATA, Linn.?

The Ceylon Curlew requires further examination; it may prove to be *N. lineatus*, Cuv., which Mr. Blyth tells me is commonly found in India.

246. NUMENIUS PHÆOPUS, Linn.

This and the preceding species are common on many parts of the coast, and were often found at Aripo, but never in flocks.

Europe, Africa, Asia.

247. TRINGA SUBARQUATA, Gmel.

I have obtained this bird in May at Aripo with the breeding-plumage far advanced.

248. TRINGA MINUTA, Leisler.

This was the common Stint on the shore at Aripo, yet it appears doubtful whether it is found in India (Jerdon, Birds of India, App. p. 875).

Bill black; irides brown; feet leaden-black.

249. TRINGA SALINA, Pall.

Tringa subminuta, Midd.

I obtained two of this species at Aripo, in January 1870, for the first time. It is new to Ceylon, although Blyth, as quoted by Jerdon (*ut suprà*), states that it is the common Little Stint of India. My specimens of these two Stints have been carefully examined and identified for me in England.

Bill black; irides brown; feet dull olive.

250. TRINGA PLATYRHYNCHA, Temm.

This appears to be rare in Ceylon. Layard only obtained one two specimens quite in the north.

251. ACTITIS GLAREOLA, Gmel.

Exceedingly abundant in all wet places. I have counted twenty round a small pool in my compound at Aripo during the rains.

252. ACTITIS OCHROPUS, Linn.

Numerous, but less so than the last species.

253. ACTITIS HYPOLEUCOS, Linn.

Very common in all parts of the low country, and less so on the

hills. I have seen it as high as Nuwara Eliya in February. It is probably resident in Ceylon.

254. TOTANUS GLOTTIS, Linn.

255. TOTANUS STAGNATILIS, Bechst.

Both very common at Aripo, and generally so in the low country.

256. TOTANUS FUSCUS, Linn.

257. TOTANUS CALIDRIS, Linn.

These species were considered common by Layard; but I have not seen them.

258. HIMANTOPUS AUTUMNALIS, Hass.

Himantopus candidus, Bonn.

Not uncommon at Aripo during the rains.

259. RECURVIROSTRA AVOCETTA, Linn.

Two of these birds, killed near Jaffna, are recorded by Layard.

Almost all these small Waders are, I believe, winter visitors to Ceylon after breeding in Northern Europe or Asia.

260. HYDROPHASIANUS CHIRURGUS, Scop.

Very common in the neighbourhood of Colombo. Beautiful specimens in various states of plumage are sometimes brought in for sale by the Singhalese, who walk through the flooded marshes and wait patiently, with the water often above their waists, till they can make sure of a successful shot. I have not seen this bird in the north; but, as Layard mentions, it may be sometimes observed walking on the lotus-leaves in the lake at Colombo.

Bill bluish, tip green; irides red-brown; feet leaden.

Ceylon, India, China.

261. PORPHYRIO POLIOCEPHALUS, Lath.

Common in suitable situations, but shy and fond of concealment. They are numerous in the neighbourhood of Colombo.

Ceylon, India.

262. GALLICREX CRISTATUS, Lath.

This bird is also common about Colombo and in marshes in the south.

Ceylon, parts of India, Burmah, Malaya, China.

263. GALLINULA CHLOROPUS, Linn.

Layard met with one specimen of this bird in the north; but I have not heard of any others, although it appears to be general in India.

Europe, Asia, Africa.

264. Gallinula phœnicura, Forster.

This well-known species was first described and characteristically figured by Forster (1781) from a Ceylon specimen. It is very common in suitable situations throughout the low country; but I am not aware that it is found on the hills, except near their foot.

In what appears to be rather an old bird the upper part of the back is irregularly barred with grey, and the chestnut is confined to the sides of the rump and under tail-coverts. This was a male, and when shot was in company with a presumed female and a small black chick. Jerdon does not mention the characteristic white face and forehead in his description of this species; and I observe in the British Museum a specimen from Malaya labelled *G. phœnicura* in which the white is confined to the underparts. It appears to have rather a stouter bill, and may be a distinct race or species, possibly the one from which Jerdon took his description, in which he says "irides blood-red, legs green." These chraacters do not agree with the following in true *G. phœnicura* from Ceylon:—

Bill green, ridge dull red; irides brown; legs and feet light yellow-brown.

Ceylon, India to Malaya, S. China, Formosa.

265. Porzana pygmæa, Naum.

Layard records having obtained one specimen.

Ceylon, India, China, Japan.

266. Porzana fusca, Linn.

Recorded by Layard as rare.

Ceylon, India, E. Asia.

267. Rallina ceylonica, Gmel.

This bird arrives in Ceylon in October, just at the change of the monsoon, and takes refuge in the first place of concealment it can find, often entering the houses and hiding amongst the furniture. I have caught the bird under these circumstances at the hotel at Colombo. Although this Rail is only a winter visitor to Ceylon, specimens of it from India appear to be rare, and the North-Indian race has been separated by Blyth under the name of *R. amauroptera*. The distribution of the true *R. ceylonica* appears to be uncertain.

Bill dusky above, green below; irides red-brown ("carmine, with an inner circle of yellow," *Layard*); feet leaden brown.

Ceylon, S. India.

268. Rallus striatus, Linn.

Ceylon, India, Burmah to Malaya, Formosa.

269. Rallus indicus, Blyth.

Ceylon, India, Tientsin.

These two species have both been recorded by Layard, but are said to be rare. *R. indicus* is very close to *R. aquaticus* of Europe, but

has been separated by Blyth; I have not had an opportunity of comparing them.

270. LEPTOPTILOS JAVANICA, Horsf.

I have seen this Stork close to Aripo and a few miles from Trincomalie, on both occasions in small parties. I believe it is a winter visitor and that it is only found in the northern half of the island, although by no means uncommon in particular districts.

Ceylon, India, Burmah to part of Malaya, Hainan.

271. MYCTERIA AUSTRALIS, Shaw.

Layard mentions having seen this bird near Jaffna; but I have never met with it.

Ceylon, India to Australia.

272. CICONIA EPISCOPUS, Bodd.

Ciconia leucocephala, Gmel.

Described by Layard as common in swampy lands; and although I have not met with the bird, it appears to be well known in suitable situations.

Ceylon, India to Malaya.

273. ARDEA CINEREA, Linn.

This Heron, considered by Layard to be very rare, is not at all uncommon in Ceylon. I have seen it in many parts of the island, and have had an opportunity of examining young birds on more than one occasion.

Asia, Africa, Europe.

274. ARDEA PURPUREA, Linn.

More common than the last species; it is very numerous in the south, and breeds near the Amblangodde Lake, a few miles from Galle.

Asia, Africa, Europe.

275. HERODIAS ALBA, Linn.

276. HERODIAS EGRETTOIDES, Temm.

Ardea intermedia, Wagler, apud Layard.

277. HERODIAS GARZETTA, Linn.

278. DEMIEGRETTA ASHA, Sykes.

279. BUPHUS COROMANDUS, Bodd.

These five species are all said by Layard to be common, and to breed in Ceylon. I have no doubt he is quite correct. Egrets of different kinds are abundant in the swamps throughout the island; but as I brought home no specimens with me, I cannot be sure of the correctness of my identifications. I have occasionally seen spe-

cimens of one species at Nuwara Eliya, in October, with a black bill and greenish feet, probably *H. garzetta*; but these birds are mostly found in the low country. They appear to be all widely distributed.

280. ARDEOLA GRAYII, Sykes.

Ardeola leucoptera, Bodd., apud Jerdon.

Exceedingly common in Ceylon.

281. BUTORIDES JAVANICA, Horsf.

Common, and resident in the north. I have occasionally seen it near Colombo.

Bill black above, yellow below; irides yellow; feet yellow-green.

Ceylon, India, Burmah to Malaya, China.

282. ARDETTA FLAVICOLLIS, Lath.

283. ARDETTA CINNAMOMEA, Gmel.

284. ARDETTA SINENSIS, Gmel.

Of these three species *A. cinnamomea* is the commonest. They appear to be confined to the southern half of the island, and are all found in the neighbourhood of Colombo. They range from India more or less eastward.

285. NYCTICORAX GRISEUS, Linn.

Not uncommon in suitable places.

Asia, Africa, Europe.

286. GOISACHIUS MELANOLOPHUS, Raffles.

I was fortunate in getting a specimen of this purely eastern Bittern at Aripo, in November 1866; it was hiding among some low bushes a few yards from my house, and was a female in immature plumage. My shot disabled but did not kill it, and it struck at me furiously with its bill as I endeavoured to extricate it from among the thorns, the neck-feathers being erected in true Bittern fashion. Layard first observed this species in Ceylon, and obtained two or three specimens near Colombo. It is remarkable that this common Malay species should not yet have been observed in India, as the birds obtained by Layard and myself (no others are recorded from Ceylon) were all found on the west coast, and my specimen was from that part of the coast where migrants from India generally appear first.

Ceylon, Malaya, Japan, Philippines.

287. TANTALUS LEUCOCEPHALUS, Forster.

Ceylon, India, Burmah, Amoy.

288. PLATALEA LEUCORODIA, Linn.

Asia, Africa, Europe.

289. Anastomus oscitans, Bodd.

Ceylon, India.

290. Threskiornis melanocephalus, Linn.

Ceylon, India, Burmah, Arrakan, China?

These four species are resident in Ceylon, and abundant in many localities, but, I believe, more numerous in the south and south-east than elsewhere, except, perhaps, the last one, which Layard says is common in the north and north-west. I have only seen it on two occasions near Aripo. *T. leucocephalus* was first described from a Ceylon specimen.

291. Falcinellus igneus, S. G. Gmel.

Not uncommon near Aripo, and apparently confined to the north. World-wide distribution.

292. Phœnicopterus antiquorum, Temm.

Phœnicopterus roseus, Pall., apud Jerdon.

I have seen this species occasionally at Aripo in October and November; they were in flocks of from twenty to thirty, and presented a remarkable appearance as they flew in single file, with outstretched head and legs. Layard speaks of having seen them in very large numbers on the north and east coasts.

Parts of Asia, Africa, and Europe.

293. Sarkidiornis melanonotus, Forster.

Ceylon, India, Burmah.

294. Anserella coromandeliana, Gmel.

Ceylon, India, Burmah, Malaya.

295. Dendrocygna javanica, Horsf.

Dendrocygna arcuata, Cuv.

Ceylon, India, Burmah, Malaya.

296. Spatula clypeata, Linn.

Asia, Europe.

297. Anas pœcilorhyncha, Penn.

Ceylon, India, Burmah.

298. Dafila acuta, Linn.

Asia, Europe.

299. Querquedula crecca, Linn.

Asia, Europe.

300. Querquedula circia, Linn.

Asia, Africa, Europe.

These eight species are all recorded by Layard; and *S. melanonotus* was first obtained in Ceylon. The only one commonly distributed throughout the island is *D. javanica*; it breeds in many localities, and is known among Europeans as the "Teal." *A. coromandeliana* is tolerably numerous in the north and east, and, I am told, breeds near Battacaloa; it is sometimes found near Colombo. The others are mostly found in the north, where, according to Layard, *Q. crecca* and *circia* are very abundant in winter. Layard also mentions having seen on several occasions, through a telescope, what he believed to be *Branta rufina*, Pall.; but that species has not been yet identified from Ceylon.

301. PODICEPS PHILIPPENSIS, Bonn.

Very common on all large pieces of water, and often associated in flocks. I have counted thirty-eight together on the Colombo lake.

Bill black, tip white, base of lower mandible dull green; irides dark yellow; legs and feet blackish green in front, black below (♀ killed in July).

Ceylon, India, China, Formosa, Hainan.

302. THALASSIDROMA ——?

A species of Stormy Petrel is often seen in Colombo harbour and on the west coast in the bad weather during the south-west monsoon, but no specimen of it has yet been obtained; it has appeared to me to be entirely black, with the exception of the white rump.

303. CROICOCEPHALUS ICHTHYAËTUS, Pall.

Layard mentions having seen a pair of these birds at Pt. Pedro after a severe storm. It appears to be only occasionally seen on the Indian coast.

304. XEMA BRUNNICEPHALA, Jerdon.

This is the only true Gull commonly found in Ceylon. It is very abundant in the north, and is seen at times on all parts of the coast.

Ceylon, India, Pekin?

305. SYLOCHELIDON CASPIA, Lath.

306. GELOCHELIDON ANGLICA, Montagu.

307. HYDROCHELIDON LEUCOPAREIA, Natt.

Hydrochelidon indica, Stephens.

These species I have found common in Ceylon, and I have no doubt of their being resident there. *S. caspia* may be seen at all times of the year, almost invariably in pairs, flying along the shore just outside the line of beach. I have shot *G. anglica* in April, July, and December, but have not met with one in the full breeding-plumage.

308. SEENA AURANTIA, Gray.

Said by Layard to be common. I have not actually identified

this species, but believe I have often seen it near the Aripo pearl-banks.

309. STERNA MELANOGASTER, Temm.

I have frequently seen this Tern near Aripo, and occasionally at Colombo. Layard found it common on some of the inland lakes as well as on the coast.

310. STERNA NIGRA, Linn.

Sterna leucoptera, Temm.

I shot one of a pair of these birds in May 1866. They were flying about over a small tank, not very far from the shore, about six miles from Aripo, and were in rather imperfect plumage, the head and neck being speckled. The characters of the species, however, were unmistakable. My specimen is now in the Colombo Museum. This is the only occasion of this Tern having been recognized in Ceylon; and it has only been recently added by Mr. Hume to the Indian avifauna.

Ceylon, India, China, North Africa, South Europe.

311. STERNA GRACILIS, Gould?

I include, with some doubt, under this heading a Tern shot in July 1869, on the Colombo beach; others of the same kind were killed at the time; and they were all in rather immature plumage. This specimen has been examined by Mr. Howard Saunders and Mr. Gould, and is believed by those gentlemen to be *S. gracilis*, and in that case a visitor to Ceylon during the Australian winter. It had the bill reddish black, irides black, and feet dull fleshy red. *S. gracilis* is allied to *S. hirundo*, but has the bill slighter, the upper tail-coverts grey as on the back and tail, and the whole under surface white.

312. STERNULA SINENSIS, Gmel.?

There is, I think, some doubt about the species to which Layard refers under the name of *S. minuta*, and which he speaks of as frequenting the inland lakes, though "most common on tanks and still waters near the sea-shore." I have never succeeded in obtaining a specimen of true *S. minuta*; and Mr. Legge, who has collected many of the Ceylon Terns, has been equally unsuccessful; but we have both frequently met with a small species in winter dress which may have been mistaken for it. This bird agrees in measurements and general colouring with *S. sinensis*, Gmel. (*S. sumatrana*, Raffles), and differs from *S. minuta* in having a black bill and the shaft of the first primary white. It was also collected by Mr. Jesse during the late Abyssinian expedition.

313. THALASSEUS CRISTATUS, Stephens.

This Tern is not uncommon on the west coast during summer. I have identified a specimen killed on the beach at Colombo in company with smaller species.

314. THALASSEUS MEDIUS, Horsf.

Thalasseus bengalensis, Less., apud Jerdon.

A Tern apparently of this species is very common.

315. ONYCHOPRION ANÆSTHETUS, Scop.

I do not know this Tern; but Layard mentions having obtained three specimens.

316. PHAËTON RUBRICAUDA, Bodd.

During my annual cruises on the Ceylon coast, I have seen this bird sufficiently near to identify it with certainty, as it hovered over the vessel. All the Tropic birds I have seen there, however, have had white tails; and, as I find among my notes mention of one instance of the bill being red, I conclude that bird was an immature example of the above species. I am very confident I have also seen the yellow-billed species, *P. flavirostris*, Brandt, but I have no special record of the colour of the bill. I shall therefore only call the attention of future observers to that species.

317. SULA FIBER, Linn.

In February and March 1868 I had many opportunities of watching a pair of Boobies which frequented the neighbourhood of the Aripo pearl-banks, about ten miles from the land. They used often to perch on a large iron buoy close to my usual anchorage at night. I only saw them during that one season; and they have not been otherwise recorded.

318. ATTAGEN MINOR, Gmelin.

Attagen ariel, Gould.

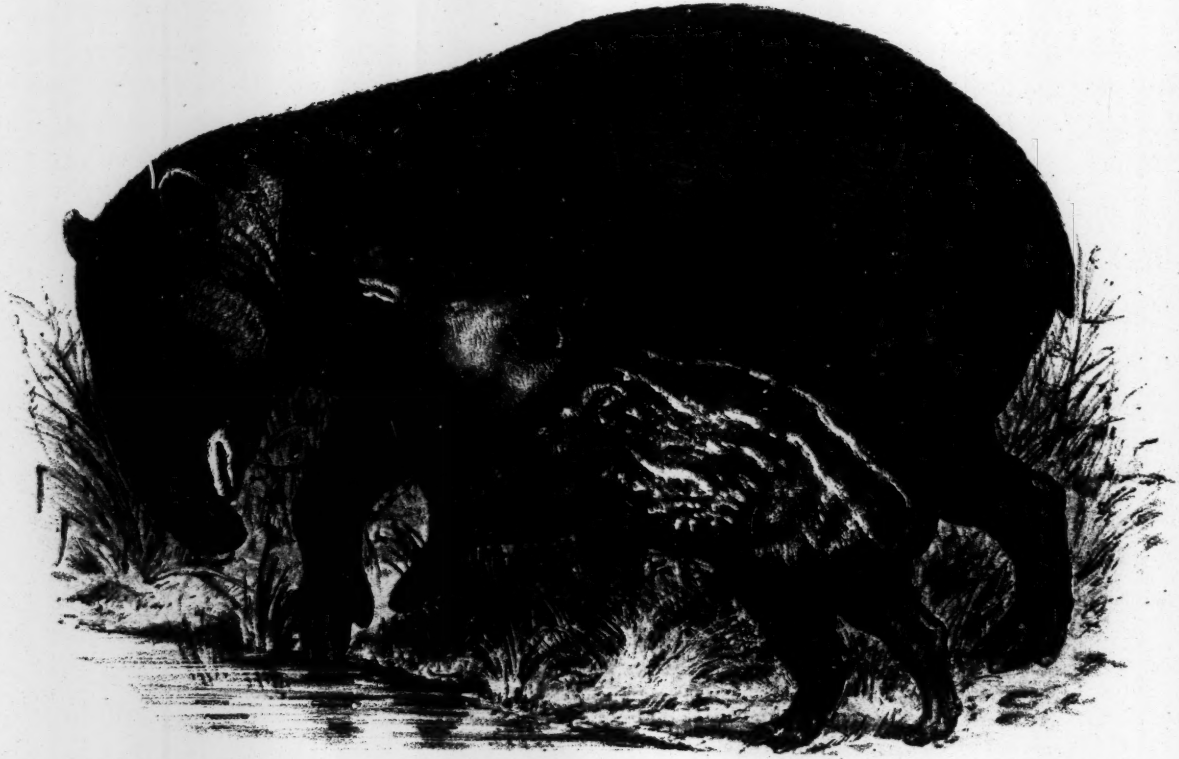
Frigate-birds have been killed in several localities on the west coast; and I have observed them on many occasions at Aripo during the strength of the south-west monsoon. They were generally in parties of five or six, and at a considerable height above the shore. Their action, as they hung as it were against the gale, slowly swaying, first on one side, then on the other, strongly reminded me of the behaviour of a large paper kite when it has mounted high in the air. Without any perceptible movement of their partially extended wings, these birds remained as if suspended in the air, but very slowly working against the wind, and gradually advancing along the line of beach. Layard mentions these birds under the name of *A. ariel*, Gould, a species from the Australian seas, but which also has been recorded by Swinhoe from Amoy.

A. aquilus, Linn., is found in the Indian seas; and it is not unlikely that some of the Frigate-birds seen on the Ceylon coast may belong to that species.

319. PELECANUS PHILIPPENSIS, Gmel.

I have seen Pelicans near Trincomalie, and at the entrance to Kokeley Lake, on the north-east coast. Their breeding-stations

BRITISH
28OC73
MUSEUM



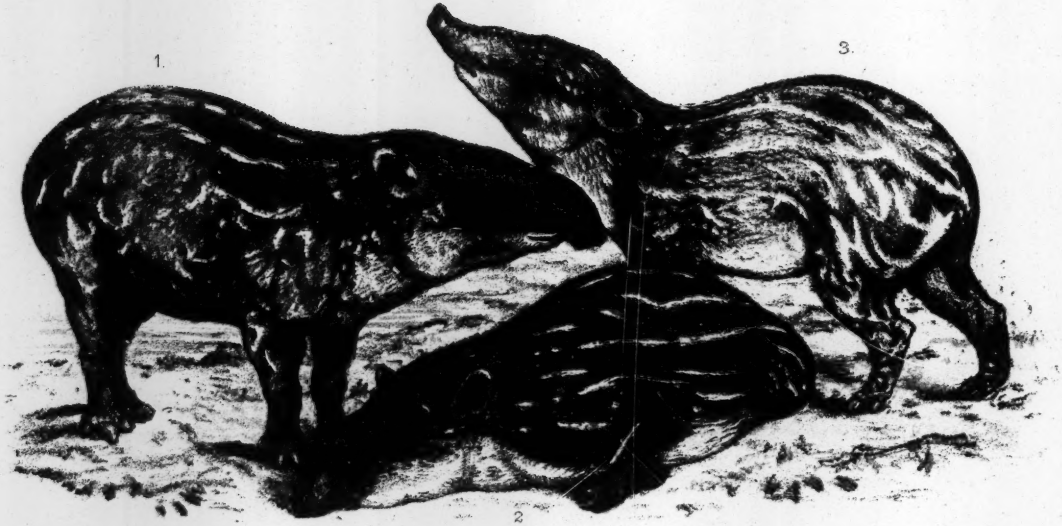
C. Berjeau del. et lith.

TAPIRUS LEUCOCENYS.

Mintern Bros. imp.

TAPIRUS LEUCOCENYS.

BRITISH MUSEUM
28 OCT 73



C. Burgess del. et lith. Mintern Bros. imp.

1. TAPIRUS ENIGMATICUS. Jr. 2. ECUADORENSIS. Jr. 3. TAPIRUS TERRESTRIS. Jr.

are in that part of the island; and they do not appear to wander far away.

Ceylon, India eastward.

320. GRACULUS SINENSIS, Shaw.

Recorded by Layard; I have not identified it.

Ceylon, India, Eastern Asia.

321. GRACULUS JAVANICUS, Horsf.

Very numerous in backwaters along the coast and in lakes inland. It may be seen in dozens perched on the stakes of the fishing-kraals, and will generally allow a boat or canoe to approach within a short distance.

Ceylon, India, Malaya.

322. PLOTUS MELANOGASTER, Forst.

I have seen this bird frequently at Aripo; and it is common on some of the large inland tanks. It is also sometimes found near Colombo.

This species was first described and figured from Ceylon.

Ceylon, India, Burmah, Malaya.

Addendum.

323. PRIONOCHILUS VINCENS, Sclater*.

Discovered by Mr. Vincent Legge, R.A., at the foot of the hills in the south of the island. It is described as frequenting the creeping plants entwining the trunks of the trees. The discovery of this new species in Ceylon is of considerable interest, as it is quite a Malay form, and no representative of the genus has yet been found in India. *Dicæum* is its nearest ally in Ceylon.

"Bill black, paler below; irides reddish; feet brownish black."

Ceylon.

7. Notes on a New Species of Tapir (*Tapirus leucogenys*) from the Snowy Regions of the Cordilleras of Ecuador, and on the Young Spotted Tapirs of Tropical America. By Dr. J. E. GRAY, F.R.S. &c.

[Received February 21, 1872.]

(Plates XXI. & XXII.)

The British Museum has lately received the skins and skeletons of seven Tapirs collected by Mr. Buckley in Ecuador, as under:—

1 & 11. An adult female and a nearly adult male with rather long hair, from Sunia, part of the snowy range of the Cordilleras.

* See below, P. Z. S. for June 18.—P. L. S.

1. TAPIRUS ENIGMATICUS. fr. 2. ECUADORENSIS. Jr. 3. TAPIRUS TERRESTRIS. Jr.

9. A very young, brown-cheeked, many-spotted, white-throated Tapir from Sunia. Mr. Buckley says that this specimen was in the company of the above adult female (No. 1), and he was enabled to capture it because she would not leave the young one, which he considers to be the young form of the grey-cheeked species. I am sorry to doubt this account, because, on comparing the skulls, the brain-case is globular and the line of the upper surface over the brain-case is arched as in *Tapirus terrestris*, very unlike the flat-topped skull of the grey-cheeked species. The spots are much more numerous and very differently disposed from those of the half-grown specimens with the grey cheeks ; and the cheeks are brown, very unlike the cheeks of all the other older specimens of the grey-cheeked species. It would imply that the colour of the cheeks and the form and position of the spots alter as the animal increases in age.

3, 5, & 7. An adult male and female and a half-grown grey-cheeked specimen from Asuay, to the north-west of Macas.

13. A young striped male from Macas, on the river Macas or Maron, one of the branches of the Upper Amazons.

The restricted genus *Tapirus* may be divided into two sections according to the shape of the skull:—

I. *The brain-case of the skull flattened, with a straight top, and gradually raised above the plane of the nose.*

1. Tapirus pinchacus. Blackish. "Young many-spotted and striped; cheeks brown."

2. Tapirus leucogenys. Cheeks and underside of the head ashy white. Young with three or four interrupted stripes on the sides.

II. *The brain-case of the skull convex, rounded, the upper line arched, suddenly raised above the plane of the nose (cheeks brown).*

3. Tapirus terrestris.

The young specimens of this division, I think, indicate that there is more than one species confounded under this name, which I am inclined to separate.

Tapirus pinchacus.

M. Roulin discovered, about 1828, a species of Tapir on the Paraná ou Quindiu and Suma Paz, during his residence at Bogota in New Granada.

He sent a specimen of the skull to Paris, which is figured by M. Blainville. M. Roulin sent a paper to the Academy of Sciences, on which M. Cuvier made a report, which is published in the Ann. Sci. Nat. vol. xviii. p. 107, 1827.

"La tête diffère déjà à l'extérieur de celle du Tapir commun par la forme générale, son occiput n'est pas saillant, sa nuque est ronde et n'a point cette crête charnue si remarquable dans l'espèce ordinaire;

tout le corps est couvert d'un poil très-épais d'un brun noirâtre plus foncé à la pointe qu'à la racine; sur la croupe on voit de chaque côté une place nue large comme deux fois la paume de la main, et au-dessus de la division des doigts une raie blanche dégarnie de poil. Le menton a une tache blanche qui se prolonge vers la bouche et revient jusqu'à la moitié de la lèvre supérieure." (Ann. Sci. Nat. xvii. p. 109, 1827.)

Cuvier, in his report, observes:—"Mais les caractères distinctifs les plus frappans de cette espèce (le Pinchaque) ne se voient bien que dans son squelette. Les crêtes temporales sont beaucoup plus basses, et ne se rapprochent pas pour former, comme dans le Tapir commun, une crête unique et élevée, le bord inférieur de sa mâchoire est beaucoup plus droit, les os du nez sont plus forts, plus allongés et plus saillans; sous ces divers rapports ce Tapir des Andes ressemble davantage à celui de Sumatra, et toutefois indépendamment de la couleur il en diffère par moins de hauteur proportionnelle de la tête.

"La tête du Tapir des Andes ainsi que celle du Tapir Oriental, ressemble plus que celle du Tapir ordinaire au Paléothérium." (Ann. Sci. Nat. xvii. p. 109, 1827.)

M. Roulin's memoir, read at the Academy, entitled "Mémoire pour servir à l'histoire du Tapir et description d'une espèce nouvelle appartenant aux hautes régions de la Cordillère des Andes," illustrated with figures of the animal and its skull and of the skulls of the Cayenne and Simatran Tapirs, is printed in the 18th volume, p. 26, of the 'Annales,' under the name of *Tapir pinchaque*. The animal is figured in t. 1, and its skull in t. 2. f. 1, 2, 3; and he sent the skull of the specimen to Paris.

In his memoir he merely observes he saw only two males, one adult and the other rather older, nearly the same size. He adds, "J'aurais desiré en faire transporter un à Bogotá pour pouvoir à le décrire à loisir, mais on refuse de me les vendre; ainsi je dois me contenter d'en faire sur la place une description abrégée et d'en prendre au crayon un simple trait. Cependant j'obtins la tête et les pieds du plus grand, et le lendemain, à l'aide de ces pièces je pus terminer ma première esquisse. C'est la figure que j'ai l'honneur de mettre sous les yeux de l'Académie, elle est fait aux $\frac{2}{15}$ de la grandeur naturelle (pl. 1)."

"Afin de reproduire plus *correctement* le profil de la tête je me suis servi pour en déterminer le contour, de la camera-lucida de Wollaston.

"On voit que cette tête diffère de celle des Tapirs communs par l'ensemble des lignes, aussi bien que par les détails. Le muffle est de forme un peu différente, et la trompe ne présente point des deux côtés ces rides qui montrent que l'animal la tient habituellement contractée. Le menton a une tache blanche qui se prolonge à l'angle de la bouche, et revient jusqu'a la moitié de la lèvre supérieure. L'oreille manque du liseré blanc qu'elle présente dans le Tapir commun; on ne voit point non plus cette crête si remarkable qui commence sur le front, à l'hauteur des yeux, et se prolonge vers le garrot. Le cou de la nouvelle espèce est parfaitement rond, et les poils n'y ont, sur la ligne médiane, ni plus de longueur que dans les autres parties, ni une

direction différente. Le poil par tout le corps est très-épais, long, d'un brun noirâtre, plus foncé à l'a pointe qu'à la racine, et il donne à la robe cette couleur qu'on nomme zain chez les chevaux.

"Sur la croupe dans la région correspondante à la fosse iliaque, on voit de chaque côté une place nue, deux fois large comme la paume de la main; cette place n'est pas calleuse; le jeune la présentait aussi symétrique que le vieux, et d'une grandeur proportionnée.

"Au-dessus de la division des doigts on voit, comme dans l'espèce commune, une raie blanche dégarnie de poils." (Ann. Sci. Nat. 1827, vol. xvii. p. 30.)

The figure represents the anterior part of the face and head to just behind the eyes much paler than the rest of the body, and differs in that respect most decidedly from the Grey-cheeked Tapir, which has the back of the head to the upper part of the temples paler than the rest of the head. It also represents the two large naked spots on the side of the upper part of the rump which in both specimens of the Grey-cheeked Tapir in the museum are entirely absent, these parts being covered with hair like the rest of the body.

"Comparée aux têtes des deux Tapirs la nouvelle ressemble plus à l'espèce de Sumatra qu'à celle de Cayenne. Cette ressemblance se montre surtout dans la direction du front, dans sa largeur, dans le défaut de saillie de la crête bi-pariétale, dans la dimension des os du nez, enfin dans la forme de la mâchoire inférieure, dont le bord inférieur est droit dans l'un et dans l'autre, tandis que dans le Tapir de Cayenne il est fortement arqué." (Ann. Sci. Nat. vol. xviii. p. 29 & 32.)

M. Justin Goudot obtained a young female Tapir at an elevation of about 1400 mètres, nearly up to the snow-level, on the Peak of Tolimá in New Granada about 1843. He sent an account of the animal to the Academy of Sciences, Paris. MM. Geoffroy and Milne-Edwards prepared a report on his paper, which was published in the 'Comptes Rendus,' Paris, 1843, vol xvi. p. 381.

M. Goudot sent the skull of the young female to the Paris Museum; and it is figured in Blainville's 'Ostéographie,' along with the skull sent by M. Roulin, under the name of *Tapirus pinchacus*.

"C'était un jeune individu femelle qui portait encore à la partie postérieure du corps, les restes de sa livrée où l'on distinguait plusieurs bandes et taches oblongues d'un blanc sale; le pelage, très-fourni sur le corps, était d'un brun tirant sur le noir; les quatre jambes offraient des poils blancs clair-semés, surtout entre les cuisses; sous le ventre on en voyait aussi quelques-uns; des poils blancs autour l'organe femelle; il y avait aux quatre pieds une raie blanche sans poil; le bord des lèvres aux deux mâchoires était garni de poils gris avec l'extrémité brun; la trompe avait 80 millimètres depuis son extrémité jusqu'aux dents; l'animal la tenait inclinée ou pendante, la tête avait 54 centimètres de l'extrémité de la trompe jusqu'au bord interne de l'oreille; 80 millimètres de distance entre les deux oreilles; 38 centimètres du bout de la trompe jusqu'à la nuque; l'oreille longue de 115 millimètres avait son bord supérieur liseré de poils blancs, une petite touffe de poils blancs se voyait aussi en bas de son bord postérieur près la conque, le cou était rond, il n'y avait point, à la

croupe d'espace denué de poil. Les chasseurs qui avaient tué depuis peu d'années un grand nombre de ses animaux (plus de 30 ou 40) m'assurent que l'espace nu de la croupe varie suivant les individus et qu'il se voit plus grand ches les vieux; ils croyaient que l'animal acquiert cette callosité par le frottement en glissant souvent sur un sol très-fortement incliné. Quoi qu'il en soit, plusieurs de ces peaux que j'ai vues conservées pour l'usage domestique (on s'en sert comme de couchettes) m'ont offert ces mêmes plaques plus ou moins étendues.

"Mes observations établissent aussi quelques points sur lesquels M. le Dr. Roulin n'avait pu offrir que des conjectures, savoir, 1° que la nouvelle espèce habite la Cordillère centrale aussi bien que la chaîne orientale; 2° que la livrée de la femelle est noire comme celle du mâle; 3° que le jeune porte la livrée comme celle de l'espèce commune; 4° que la place nue de la croupe qui paraît constante chez les adultes n'est point une disposition congénitale. M. Roulin avait fait remarquer l'absence du liseré blanc au bord de l'oreille des deux individus mâles qu'il avait observés; ma jeune femelle présentait ce liseré, mais la différence dépendait-elle du sexe ou de l'âge? C'est ce que je ne saurait décider." ('Comptes Rendus,' vol. xvi. 1843, p. 334.)

These seem to be the only descriptions taken from the Columbian animal; and, indeed, these authors appear to be the only ones who have ever seen it in its perfect state.

Fischer, in his 'Synopsis Mammalium' published in 1829, changed the name Roulin gave to it to *Tapirus roulini*. Wagler, in his 'Syst. des Amphib.' published in 1830, gave the name of *Tapirus villosus* to this species; but these authors are only compilers, and only knew the animal from Roulin's description; they never saw it. And I cannot conceive why it was called *villosus*; for Roulin's figure certainly represents the animal with very short close hair.

The name *villosus* (or Hairy Tapir as it has been called by one) is not applicable to the specimens of *Tapirus leucogenys* brought by Mr. Buckley from Ecuador, which have the hair quite short and rigid as that of *T. terrestris*, but more abundant and closer, except in one nearly full-grown male from Sunia, which had the hair rather longer and softer.

It is also probably the Tapir mentioned by Mr. Robert B. White as seen on the Volcano of Puracé in the Central Cordillera, in the southern part of Columbia. He only saw it through a telescope at half a mile distance, and says it is greyish black; he says it is never found lower than 350 metres above the sea-level, and sometimes ascends to 400 metres (see Proc. Zool. Soc. 1870, p. 51). Dr. Sclater considers it the same as *Tapirus roulini* of Fischer. It is remarkable that all the specimens described by the French writers under the name of *T. pinchaque* came from Columbia, while the specimens of the White-cheeked Tapir (*T. leucogenys*) were obtained in Ecuador; and it would be curious if they should be distinct, as the French descriptions lead us to suspect. It would be curious to know what is the species said to be found in the Cordilleras further south in Peru. Tschudi, in the 'Fauna Peruana,' p. 213, says this species of Tapir

is found in Peru on the eastern slope of the Cordilleras, at an elevation of 7000 or 8000 feet, which is above the snow-line. He had never been able to see it, but thinks it is probably *Tapirus roulini*.

De Blainville, in his monograph of Tapirs in the 'Ostéographie,' gives a figure of the skull sent to the Paris museum by M. Roulin and of the younger one sent by M. Goudot, under the name of *T. pinchacus*.

In my monograph of the Tapirs in the 'Proceedings of the Zoological Society' for 1867, p. 884, I used this name, and gave an abstract of M. Goudot's paper as the only one derived from a personal examination of the animal.

I am not aware that any other remains of this animal but the two skulls in Paris exist in any museum in Europe or America. It is very desirable that specimens should be obtained from Columbia for the purpose of comparison with the specimens brought home by Mr. Buckley, to discover if the differences are real or only rest on the inaccuracy of the French observers: therefore it is much to be regretted that Mr. White failed in obtaining specimens for the Zoological Society. Since we obtained Mr. Buckley's specimens I have been offered for sale a skin from Ecuador; the writer informed me he had two skins, one of which he intended to present to the Smithsonian Institution; so that we may hope for more specimens from Ecuador; but as yet we have received none from Columbia.

If this species is from Columbia, which is yet to be determined by the comparison of specimens from that country, it will bear the following synonyma:—

TAPIRUS PINCHACUS.

Tapir "pinchaque," Cuvier, Ann. Sci. Nat. xvii. p. 107 (1829).

Tapir pinchaque, Roulin, Ann. Sci. Nat. xviii. (1829), p. 206, t. i. (animal), t. ii. f. 1, 2, 3 (skull); Goudot, Comptes Rendus, tom. xvi. p. 331 (1843).

Tapirus roulini, Fischer, Synops. Mamm. Add. p. 406 (1829); Wagner, Schreber's Säugethiere, vi. p. 392; White & Sclater, P. Z. S. 1870, p. 51.

Tapirus villosus, Wagler, Syst. des Amphib. p. 17 (1830).

Tapirus pinchacus, Blainville, Ostéog. *Ungul.* t. i. f. 5; Gray, P. Z. S. 1867, p. 884; id. Cat. Carn. Pach. et Edent. p. 259.

Hab. Cordilleras of Columbia.

TAPIRUS LEUCOGENYS. (The Grey-cheeked Tapir.) (Plate XXI.)

The adult is black, covered with close harsh hair, slightly grizzled at the tip; the head rather paler; the sides of the temple, cheeks, from the back of the eye to the base of the ears, and upper part of the sides of the neck, and whole underside of the head, ashy white varied with black; upper and lower lips pure white; ears with scarcely any indication of white edges, and covered with hair like the top of the head, but paler.

The rump in the old and younger specimens is uniformly covered with hair similar in colour, abundance, length, and texture to the rest

of the body, neither of them presenting any worn appearance or bare spot on the hinder part of the back.

A young female specimen which has a flat forehead is of a nearly uniform dark brown colour; it has three nearly continuous, pale ash-coloured, longitudinal lines, which are formed of more or less separate, oblong, elongated spots, and has a series of more obscure spots between them, which are larger and more distinct upon the underside of the belly; the side of the head and upper part of the neck, from the back edge of the eye, including the base of the ear, and the whole of the underside of the head, is ashy white, varied with brown hairs; the upper edge and the base of the outer edge of ears and lips white. The hinder part of the back in all the specimens is covered with hair like the rest of the animal.

Hab. Ecuador, on the Cordilleras at Sunia and Asuay.

The skull of this species agrees very well with the figures that De Blainville gives of the skulls brought home and presented to the Paris Museum of the Tapir Pinchaque, figured as *Tapirus pinchacus* in Blainville's 'Ostéographie;' but the description given by these authors of the external appearance of the adult and young of that species is so different from the specimens brought from Ecuador by Mr. Buckley that I am induced to regard them as a new species, quite different from the *T. pinchacus* of Columbia or New Granada.

The lower jaw of the old and young specimens of *T. leucogengs* brought by Mr. Buckley differs from the figure of the specimens brought by M. Roulin in the upper part of the hinder edge, which is more prominent than the lower part, which is most produced in Blainville's figure. They much better agree with Blainville's figure of the skull brought by M. Goudot, but have the upper a little more produced. The difference between the two skulls of Blainville may only be that of varieties.

I may observe the necks of the skins appear to be as much crested as that of *Tapirus terrestris*, and the brown hairs of the body with minute grey tips; the whole underside of the head, the cheeks, and sides of the temples are greyish white, which appear to be darker than the rest of the head in M. Roulin's figure.

One of the specimens brought by Mr. Buckley from Sunia, a male, had the hair longer and softer than the rest, but did not otherwise differ.

The adult female said to be the mother of the young specimen called *T. ænigmaticus* has very distinct white borders to the ends of the ears, and the whole of the hinder part and underside of the head is greyish black, the pale cheeks and throat not being so distinctly marked and defined as in the other specimens. This may be the character of the adult female; but the grey cheek in the younger female is quite as defined as in the male. The front of the face and the top of the head are considerably darker than the cheeks, very unlike the figure of the *Pinchaque*.

In this specimen the hair on the hinder part of the back is shorter and more sparse, and there are two elongated irregular patches, which have the hair more or less worn off, separated from each other by a

narrow hairy band, very unlike the round naked spots in the figure of the *Pinchaque*.

TAPIRUS LEUCOGENYS, jun., or T. ÆNIGMATICUS. (Plate XXII. fig. 1.)

Fur rather soft, abundant, and rather woolly, dark blackish brown, with grey tips to the hairs, which are more abundant on the sides of the face and front of the body. Back pale-spotted; the spots on the middle of the back small, oblong, forming two interrupted straight lines; the spots on the upper side of the back more elongate, and forming a rather curved line, terminating before it reaches the haunches. The shoulders, hams, sides of the body, thighs, and rump marked with irregularly disposed white spots, some of which are more or less perpendicular; those on the hinder part of the body and thighs larger and more elongate, and irregularly disposed; the lower part of the legs spotless, blackish brown. The upper lip, the gullet, lower part of the cheeks, throat, and chest white, varied with small, darker spots. The upper edge and base of the outer sides of the ears white.

Hab. Sunia, on the upper parts of the Cordilleras.

Mr. Buckley declares that this young specimen was obtained along with its mother, an adult female of the Grey-cheeked Tapir, from Sunia. This was secured because it would not leave its young; and therefore they were more easily caught. If there is not some mistake in this account, which one can hardly doubt, it must be the young of that species; but it is so exceedingly different that I think it better to give it a provisional name, as the difference between the young and the rather older specimen of this species is so great that I do not believe such has ever been observed in any group of species of Mammalia.

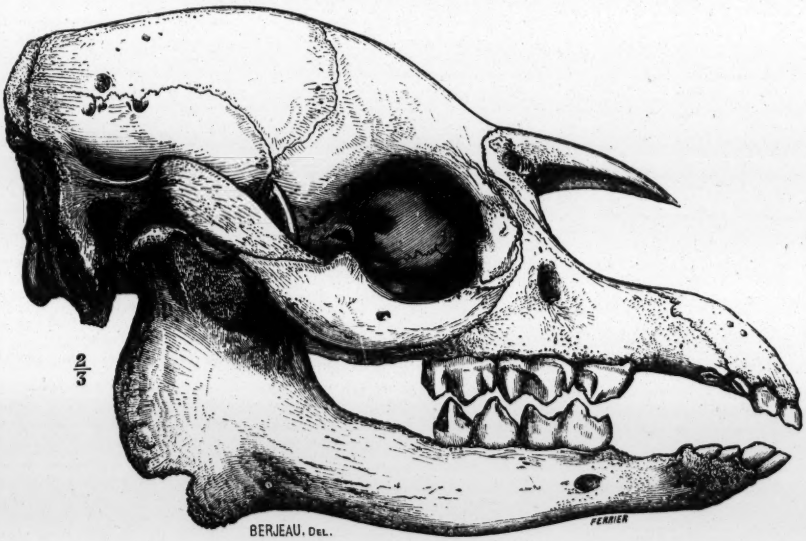
Thus, for example:—

1. The temple and cheeks are brown like the rest of the body; whereas in the half-grown but spotted specimen they are, including the ears, as in the adult, pale whitish.

2. The back has two straight lines of spots; sides with an upper series of spots, forming a rather irregular line from the back of the shoulders to the front of the haunches, and very numerous spots which are placed below the lines in irregular series, and placed in very different directions; the fore legs have an irregular perpendicular stripe above, and the hind legs are marked with irregularly disposed oblong spots; whereas in the half-grown grey-cheeked specimen they are brown, with only three series of spots on each side, forming more or less irregular lines, the second one from the top being most irregular, the two upper ones being continued over the thighs towards the rump.

3. The upper lip, the whole underside of the head and throat, the lower part of the side of the head, and the whole chest white, more or less clouded with brown spots; whereas in the young with stripes, and the adult *T. leucogenys*, the white of the cheeks only extends to the back of the under part of the head; the throat, underside of neck, and the chest are brown like the rest of the animal.

I know no such transformation in the disposition and form of the colour in any other mammal in passing from youth to age. The spots are obliterated; and sometimes the coloured part becomes altered or obliterated; but I know no instance of the disposition and character of the colour being changed as occurs in these two specimens. If Mr. Buckley's account is correct and this is the very young state, it is an entirely new fact in the study of Mammalia.



Skull of *Tapirus leucogenys*.

The skull of this young specimen has a very short face, and a globular brain-case, which is rather convex on its upper surface in the central line, and raised above the plane of the nose, much more like the skull of *T. terrestris* than that of *T. leucogenys*. The skull of the half-grown lined specimen has a small brain-case with a flat upper surface, very like the skull of the adult of that species, which is also the case with the young spotted specimen of *T. pinchacus* in the Paris Museum, brought by M. Goudot and figured by Blainville. I do not lay much stress on this difference in the form of the young and adult animal from the half-grown and adult specimen of *T. leucogenys*, as I have not been able to form a series showing the changes the skull of Tapirs undergoes during growth from the very young state to adult age; but certainly the form of it and the half-grown are so exceedingly different that I think it well they should be described.

If this specimen should be proved to be the proper young of *T. leucogenys*, it shows that there is less difference between the two sections of the genus in the very young than in the half-grown and adult animals.

Mr. Buckley brought a young male striped specimen from Macas (No. 13). This animal evidently belongs to the same section as *T. terrestris*, but it is so different from the young of that species that it is certainly a very distinct local variety or else a distinct species of that animal. It may be thus described:—

TAPIRUS ECUADORENSIS. (Plate XXII. fig. 2.)

Young blackish brown; throat, lower part of cheeks, chest, and belly yellow. Back with two interrupted lines, or narrow longitudinal stripes, rather diverging from one another, and near together on the shoulders and rump. Sides with four more or less interrupted yellowish streaks, the uppermost one with two oblique, elongated stripes in front, and a much longer, longitudinal stripe behind. The second one with one oblique, elongated spot in front, and with a very long streak ascending across the thighs to the base of the tail, with an oblique streak from the former, at the front of the thigh, continued to the rump. The two lower series of spots on the sides and thighs formed of very unequally long spots, those on the shoulders being very obliquely placed. The fore legs with one or two oblong transverse spots on the upper part, and the hinder ones with unequal, different-sized spots to the base of the toes. The edges of the ears and a few small spots under and behind the eyes white.

Hab. Ecuador, Macas, on the river Macas, one of the branches of the Upper Amazons.

The nose, the whole upper part of the head, and the back of the neck are dark brown like the rest of the body, very unlike the many-spotted head of the young *T. terrestris*; and it looks like a bigger animal than that species.

TAPIRUS TERRESTRIS. (Plate XXII. fig. 3.)

The young of *T. terrestris* in the British Museum, which has no particular habitat, is very differently marked. It has two nearly continuous stripes on the middle of the back, which are united and arched behind on the loins, with some transverse spots above and below it. There are two longitudinal stripes on the upper part of each side, which unite behind and are continued in a single line to the upper part of the base of the tail. The whole head, the upper part of the neck, the sides, the outside of the fore and hind legs, and the inside of the feet are covered with very differently sized, shaped, and disposed white spots, those on the shoulders and thighs being elongate, those on the lower part of the sides being elongate and obliquely placed, and those between the upper lateral stripes and on the head and neck very small as compared with the others on the chin, the throat, the whole chest, and the under part and the inner side of the fore legs.

March 19, 1872.

John Gould, Esq., F.R.S., V.P., in the Chair.

The following report on the additions to the Society's Menagerie during the month of February 1872 was read by the Secretary:—

The total number of registered additions to the Society's Menagerie during the month of February 1872 was 127, of which 6 were by birth, 24 by presentation, 92 by purchase, 2 by exchange, and 3 were received on deposit. The total number of departures during the same period by death and removals was 121.

The principal arrival during the month was that of the female Hairy-eared Rhinoceros (*Rhinoceros lasiotis*), which was announced to the Society at the last meeting*.

This animal was captured in January 1868 near Chittagong, in the manner described in the following extract from a Calcutta newspaper:—

"The quiet station of Chittagong has been lately enlivened by the presence of a Rhinoceros. It appears that about a month ago some natives came into Chittagong and stated that a Rhinoceros had been found by them in a quicksand, and was quite exhausted with the efforts to release herself. They had attached two ropes to the animal's neck, and with the assistance of about 200 men dragged her out, and keeping her taut between two ropes they eventually made her fast to a tree. The next morning, however, they found the Rhinoceros so refreshed and making such efforts to free herself that they were frightened, and made application to the magistrate of Chittagong for protection. The same evening Captain Hood and Mr. H. W. Wickes started with eight Elephants to secure the prize, and after a march of about sixteen hours to the south of Chittagong they came up with the animal. She was then discovered to be a Sumatran Rhinoceros, rather more than four feet in height, with a smooth hairy skin somewhat like that of a Pig, and with two horns (one up high, almost between the eyes and small, the other rather larger and just above the nose), and the upper lip almost coming to a point and protruding a little.

"The Elephants at th. first sight of the Rhinoceros were very much afraid and bolted one and all, but after some little exertion they were brought back and made to stand by. A rope was now with some trouble attached to the animal's hind leg and secured to an elephant; at this juncture the Rhinoceros roared, the Elephants again bolted; and had it not been for the rope slipping from the leg of the Rhino-

* See *antea*, p. 185, where it is spoken of as *R. sumatrensis*. But an example of the true *R. sumatrensis* from Malacca having been subsequently received (*v. infr.* P. Z. S. Nov. 1872), it became obvious that this Rhinoceros was quite distinct; and I have proposed to call it *R. lasiotis*.—P. L. S., Aug. 28. 1872.

ceros, that limb might have been pulled from the body. The Rhinoceros was, however, eventually secured with ropes between Elephants and marched into Chittagong in perfect health. Two large rivers had to be crossed:—first, the Sungoo river, where the animal was towed between Elephants, for she could not swim and could only just keep her head above water by paddling with the fore feet like a Pig; and secondly, the Kurnafoolie river, when the ordinary cattle ferry-boat was used. Thousands of natives thronged the march in, which occupied a few days, the temporary bamboo bridges on the Government road invariably falling in with the numbers collected thereon to watch the Rhinoceros crossing the stream below; and sometimes the procession was at least a mile in length. The 'Begum,' as the Rhinoceros has been named, is now free from all ropes and kept within a stockade enclosure, having therein a good bath excavated in the ground and a comfortable covered shed attached. She is already very tame, and will take plantain-leaves or chuppattees from the hand, and might almost be led about by a string."

The fact of a Two-horned Rhinoceros being in captivity in Chittagong having become known to the Council of the Society, various endeavours were made to come to some arrangement with the owners for its acquisition for the Society's Menagerie. These, however, never came to any definite result. Mr. William Jamrach being in Calcutta last November was more successful in his negotiations, and on his return to this country last month was fortunate enough to bring with him the animal in perfect health and condition.

This animal has been so well described by Dr. Anderson in his communication to the Society on this subject read on the 6th of February last (see *anteà*, p. 129), that I have but few particulars to add to what he has said.

The drawing by Mr. Keulemans now exhibited (Plate XXIII.) will give a good idea of its external appearance.

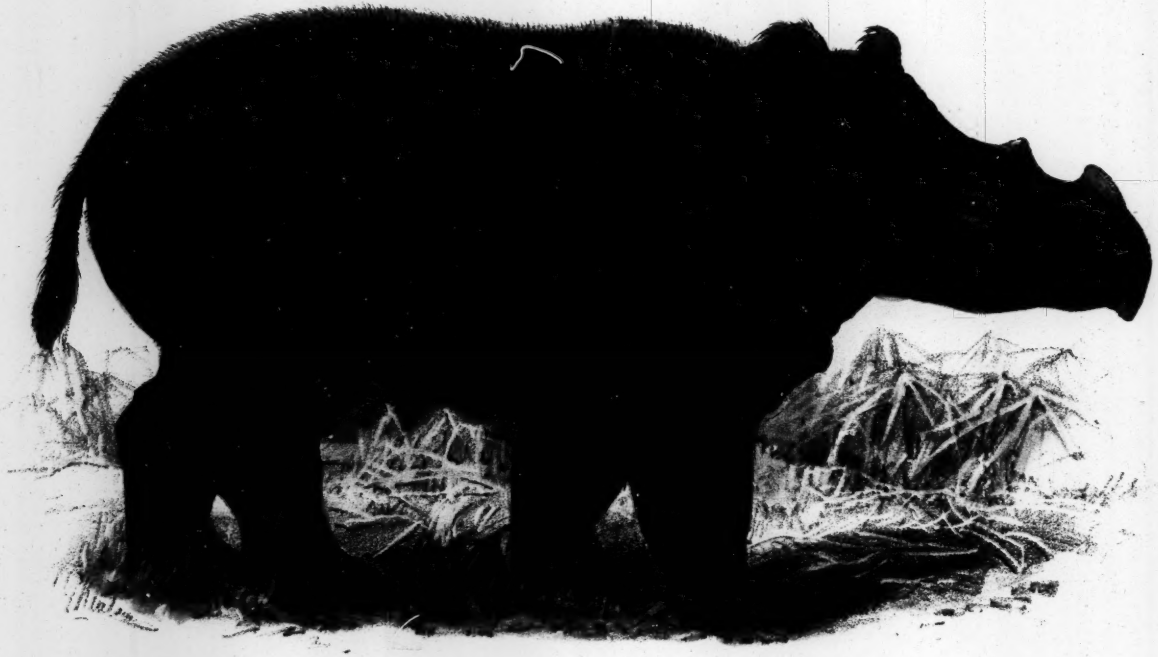
As far as I have been able to make out by examination of its mouth, there are at present no upper incisors, but a pair of lower incisors only, of which the right is furthest up. I suppose, therefore, that the upper incisors are not developed until late in life, as our animal must be at least six years old.

Some other animals of great interest were obtained from Mr. Jamrach along with this Rhinoceros, namely:—

1. A female of the Macaque recently described by Dr. Anderson as *Macacus brunneus* (see *anteà*, p. 203 and Plate XII.). Two other examples of this Monkey likewise arrived from Calcutta under Mr. Jamrach's care—a male presented by Mr. Oscar Fraser, Assistant in the Indian Museum, Calcutta, and a female presented by Lieut. Burne.

We have now, therefore, in the Gardens three specimens of this Burmese Monkey, which is a species of great interest, and quite new to us. But, as I have already stated (*anteà*, p. 203), it seems to be the same species as that originally discovered by Diard in

P.Z.S.1872 PL XXIII.



J. Kneulemans ad.

W.& N. Hanhart imp.

RHINOCEROS LASIOTIS.



J. Wolfenmans. M & N Hanhart imp.

MACACUS RUFESCENS.

2800073



J. G. Keulemans lith.

M & N Hanhart imp.

MACACUS RHESO-SIMILIS.





J.G.Keulemans lith.

M&N Hanhart imp.

CASUARIUS BICARUNCULATUS

Cochin China, and described and figured by Is. Geoffroy as *M. arctoides*.

2. Along with the examples of *Macacus arctoides* Mr. Jamrach brought a single male specimen of another closely allied, but apparently distinct, species of Macaque, which he obtained in the Calcutta market. Having the same general structure and short tail as *M. brunneus*, it differs in the general reddish colour of its fur. For this animal I adopt the temporary name (*Macacus rufescens*) suggested by Dr. Anderson (*anteà*, p. 204). I hope hereafter to be able to give a complete account of it. Meanwhile the accompanying figure (Plate XXIV.) will render it easily recognizable.

3. Mr. Jamrach also brought from Calcutta a single female specimen of a third Macaque, likewise apparently distinct from any other known species. On this species (Plate XXV.) I have conferred the the temporary designation *Macacus rheso-similis*. It is most nearly allied to *M. rhesus* and *M. radiatus*; and Mr. Blyth has suggested to me that it may even be a hybrid between those species.

4. Another prize secured by Mr. Jamrach in Calcutta, and obtained from him on the same date, is a fine adult specimen of the Double-wattled Cassowary (*Casuarius bicarunculatus*).

I first established this species in 1860, on an immature specimen living in the Society's Gardens *. A second, likewise immature example was obtained in 1869 †, but, like the former, unfortunately died before attaining the adult stage.

The specimen now obtained is of the highest interest, as showing how very distinct this Cassowary is from all its congeners. Referring to the arrangement of the genus which I gave in my last notice on this subject (see P. Z. S. 1872, p. 150) *Casuarius bicarunculatus* belongs to the group with the compressed casque, containing *C. galeatus* and its allies, and is more nearly allied perhaps to *C. galeatus* than to any other known species, but, putting aside the obvious distinction of the two lateral widely separated neck-wattles, may be at once distinguished, as will be seen by the accompanying figure (Plate XXVI.), by the smaller casque which rises from a much smaller basis on the vertex, and by the very different colouring of the head and neck.

5. A female Prongbuck (*Antilocapra americana*) purchased from a dealer in Liverpool on the 21st of February.

The only individual of this species hitherto ever possessed by the Society is the male received in 1865 ‡, upon which Mr. Bartlett's observations upon the shedding of its horns and Dr. Murie's notes upon the anatomy of this animal were based §. A male example of this animal was subsequently received by the Zoological Gardens of Antwerp, but has since died. So far as I know, our present specimen

* See P. Z. S. 1860, pp. 211, 248; and Trans. Zool. Soc. vol. iv. p. 358, pl. lxxiii.

† See P. Z. S. 1869, p. 149.

‡ See P. Z. S. 1865, p. 60, pl. iii.

§ See Bartlett, P. Z. S. 1865, p. 718, and Murie, P. Z. S. 1870, p. 334.

is the third which has reached Europe alive. The only appearance of horns that our animal possesses consists of two small protuberances just elevated above the skin. Except in the absence of these appendages, it exactly resembles the male of the species.

Mr. R. B. Sharpe, F.Z.S., exhibited some specimens of Blue Rock-Thrushes (*Petrocossyphus*). Referring to an article in the tenth part of the 'Birds of Europe' for full details and proofs of the conclusions at which he had arrived, Mr. Sharpe pointed out that the female of the Blue Rock-Thrush of Europe did not always remain in a spotted plumage, as was stated by authors, but ultimately got blue like the male, though she took a much longer time than the latter in assuming the mature livery. In the same way, *P. solitarius* of China ultimately passed from the blue-and-red stage (*P. manilla* of authors) into a fully blue plumage, in which state it was only distinguishable from *P. cyanus* of Europe by its smaller size. It was shown that the change from a spotted plumage to the blue-and-red dress was very gradual, as was also the gradation from the blue-and-red plumage to the full blue garb of the adult. *P. affinis* of Blyth was stated to be nothing but the intermediate stage of the last gradation, and that the variation in this supposed species was caused by the more or less advanced character of the plumage. Mr. Sharpe exhibited specimens (chiefly from the collection of Mr. Swinhoe), tracing all the stages through which the species passes, from the spotted nestling to the fully mature blue bird.

Mr. Sclater exhibited a skin of the Yellow-billed Cuckoo of the U. S. of America (*Coccyzus americanus*), which had been shot by Mr. W. H. Hudson, C.M.Z.S., at Quilines, Buenos Ayres, April 21, 1870, and was stated by that gentleman to be the only specimen of this species he had ever obtained. Except in its slightly larger dimensions, Mr. Hudson's bird did not differ from other examples of this widely wandering species, of which Mr. Sclater exhibited specimens from Jamaica, Mexico, and the U. S. of Columbia. Mr. Sclater remarked that there could be little doubt that the bird obtained by Natterer in S. Paulo, Brazil, and referred by v. Pelzeln to *Coccyzus bairdi**, was also an accidental visitor of this species, which had so often strayed even into Europe.

Major Godwin-Austen, F.Z.S., exhibited a skin of *Ceriornis blythii*, and called attention to the differences between this species and *C. satyra*, *C. melanocephalus*, and *C. caboti*. *Ceriornis blythii* had been first obtained in Upper Assam by Dr. Jerdon, having been brought from the neighbouring hills. Its exact locality and range to the west, however, were doubtful. The specimen exhibited had been shot by Mr. Roberts, of the Topographical Survey, in the Naga Hills,

* Orn. Brasil. p. 274.

near Sima-Gooding, at about 7000 feet alt., and was of great interest as settling the question of its exact habitat.

The following papers were read:—

1. Notes on a Specimen of the Broad-headed Wombat (*Phascolomys latifrons*). By Alex. Macalister, M.B. (T.C.D.), Professor of Zoology in the University of Dublin, President of the Royal Geological Society of Ireland.

[Received February 23, 1872.]

Some time ago I obtained from Mr. Gerrard, for the Dublin University Museum, a skin of this rare Wombat; and as there was a skull attached to it I caused it to be removed, and have made on the specimen the following notes. It was a young male; and its measurements, as compared with the two other recorded examples of the species, are as follows:—

	T. C. D.		Dr. Murie's.		Mr. Angas's.	
	in.	lin.	in.	lin.	in.	lin.
Length from tip of nose to root of tail	33	6	37	0	37	0
Length of tail	1	0	1	0	1	0
Height at shoulder	11	0	13	6	12	0
Height at loins	11	0	13	0	14	0

The name *P. latifrons* was based by Professor Owen in 1845 on a skull of a Wombat which he described (P. Z. S. 1845, p. 82). Another individual was afterwards described by Mr. Angas in 1861. The exact identity of the species, however, has been a matter of difference of opinion, Mr. Gould, Dr. Gray, and Dr. Murie having expressed varying views on the subject. As Dr. Murie says concerning this species (P. Z. S. 1865, p. 839) that "it at present remains uncertain whether the *P. latifrons* of Owen is yet determined—that is, as regards the identification of the skin or living animal with the skull first described and demonstrated by him to belong to a distinct species," I have therefore thought that the facts derived from my specimen might be interesting as a contribution towards the final settlement of the question of specific identity.

Dr. Murie (*loc. cit.*) describes the typical *P. latifrons* (Gould's *P. lasiorhinus*) as being of a lightish grey tinged with brown. My specimen is of a rather dark mottled grey; not like the light sandy buff of Mr. Gould's *P. lasiorhinus*, or the nearly uniform blackish brown of Dr. Gray's *P. angasii*. In my individual the roots of most of the hairs are of a dark brown, the extremities whiter or grey, the

anterior two thirds are much darker than the posterior third, and the hairs in the latter area have not the dark roots that those in front exhibit. The tips of the hairs on the sides are much lighter than on the back, and the roots of the lateral hairs are darker than the median. Dr. Murie's description of the wavy lines seen here and there, where a preponderance of the dark or light tints run side by side, is perfectly applicable to my specimen. The rufous tints noticed by him in the hairs of the rather truncated posterior extremity of the body, as well as the description of the hairs in this region, are also true of the individual under notice.

The hairs of the underside of the neck are white and silvery, diverging from the rather darker median line; and there are one or two blackish spots on the side of the abdomen. The facial surface agrees with Dr. Murie's specimen in having the dark spots at the inner and outer canthi, the former being much the larger; there are also the whitish-grey spots above and below the eye, the lower being of the two the better defined. There is, however, no blackish or dark spot in the centre of the forehead and between the eyes, as Murie found in his specimen. All the strong hairs of the eyebrow, eyelash, and whiskers are black; there are no whitish ones intermingled. The tip of the nose is covered with silvery-white adpressed hairs; the left nostril is margined on its inner side by a large spot of brown hairs, the right is surrounded by whitish hairs. The dark spot under the chin noticed by Murie is well marked; and the ears have also the white tufts on their outer sides. The head-measurements also correspond, as follows:—

	T. C. D.	Dr. Murie's.	Mr. Angas's.
	in. lin.	in. lin.	in. lin.
Length from snout to occiput	8 6	9 0	10 0
Length from nose to root of ear	7 0	8 0	
Girth above eyes	15 5	18 6	18 0
Breadth between inner canthi	3 0	3 11	3 0
Breadth between outer canthi	4 6	6 0	
Breadth between roots of ears	4 6	5 0	5 0
Breadth of ears	1 8	2 0	
Breadth of muzzle	2 0	2 6	
Length of ears	3 2	3 0	3 8

From these considerations it will be seen that my specimen is in the main identical with Dr. Murie's Wombat, and that slight variations in colour are not of great importance in this species.

The skull varies in some particulars from the descriptions given either by Professor Owen (T. Z. S. vol. iii. p. 303) or by Dr. Murie (*loc. cit.* p. 842)—which is interesting, as these two hitherto described skulls do not precisely agree with each other in all particulars. I have therefore given an account of the divergences. Like Dr. Murie's, my specimen was young—apparently still younger than his; and all the sutures are particularly distinct, not obliterated as in Professor Owen's. The following are the measurements

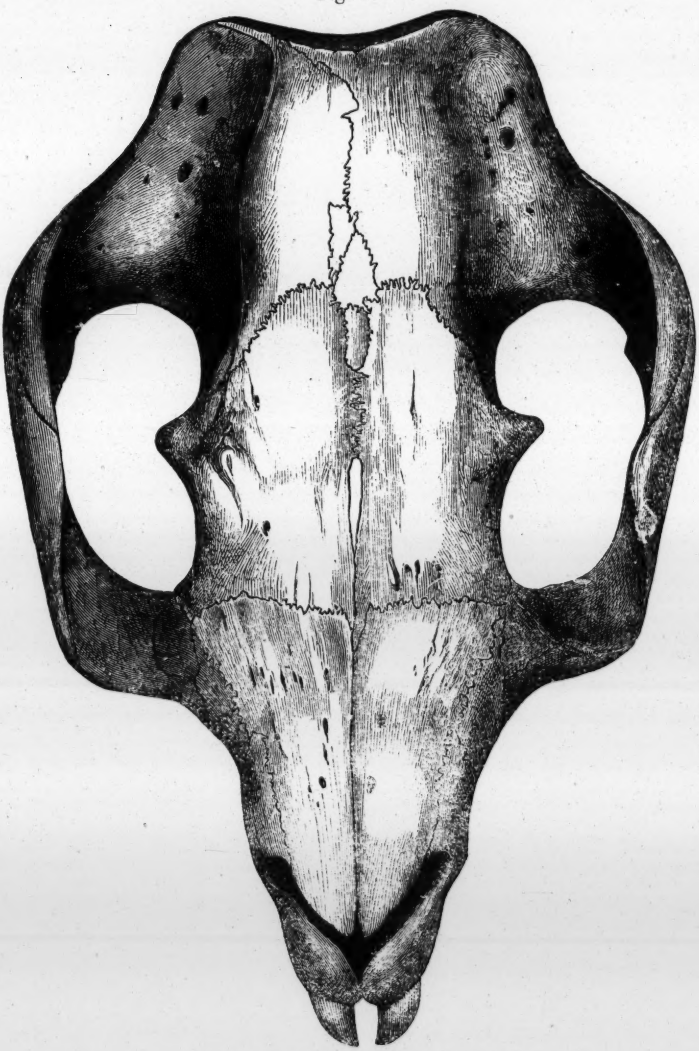
of the skull contrasted with those of Dr. Murie and Professor Owen :—

	T. C. D.	Dr. Murie's.	Prof. Owen's.
	in. lin.	in. lin.	in. lin.
Total length of cranium	6 2	6 5	6 3
Greatest width at the posterior part of the zygomatic arch	4 3	4 9	5 0
Width behind orbits when contracted by temporal fossæ	1 4	1 5½	1 3
Width at anterior part of zygomatic arch	3 10	4 0	
Length from occipital crest to temporal fossa	2 0	2 1½	
Length of nasal bones	2 0	2 2	2 0
Width of same behind (both together)	2 0	2 4	2 5
Width of same anteriorly	0 11	1 2	1 2
Length of frontal bones	2 2	2 4½	2 5
Width of same between orbits	2 5	2 7½	2 9
Width of intermaxillary	0 5	0 3	
Length of palate	3 6	3 8	3 7
Width between anterior molars	0 5	0 3½	0 5½
Width between posterior molars	0 9	0 9	0 10½
Width of both upper incisors	0 8	.....	0 9
Depth of same singly	0 3½	.....	0 3
Distance from upper incisors to molars	1 6	1 8	1 6½
Total extent of row of molars	1 9	1 10½	1 9
Length of lower jaw	4 6	.....	4 4
Greatest breadth of same	4 2		
Height in vertical line from the coronoid process	2 7	.....	2 9
Width of lower incisors	0 6	.....	0 6
Depth of the same	0 2½	.....	0 3

My specimen exhibits the characteristic features pointed out by Professor Owen (Catalogue of Osteological Specimens, vol. i. p. 334, no. 1843), namely :—"Great development of the postorbital angles; great and sudden expansion of the anterior half of the frontal bones; the superior breadth of the strip of the maxillary bone which ascends in front of the malar and lachrymal bones to join the nasal bones, and the enormous depth of the supratympanic fossæ."

The peculiar skull-features presented by it are the following :—The foramen magnum is notched posteriorly so as to give it somewhat of a trefoil figure, like that in *Phascolomys wombat* and *platyrhinus*; in Murie and Owen's specimens it is oval. The line of suture between the exoccipitals and the supraoccipital is still apparent, though the bones are united; and these sutures impinge on the foramen magnum at the sides of the posterior notch. A fainter trace of the suture between the basioccipital and exoccipital is still apparent crossing the anterior and inferior part of the condyle. An exceedingly minute postcondyloid foramen and a double anterior condyloid are present; and the lateral spurs of the basioccipital are rounded and prominent (see fig. 2, p. 501). Above the occipital crest there is the trace of a short, widely triangular, epactal bone in the lambdoidal suture, measuring 9 lines in length antero-posteriorly and 3 in breadth. This is consolidated to the left parietal; but its suture on the right

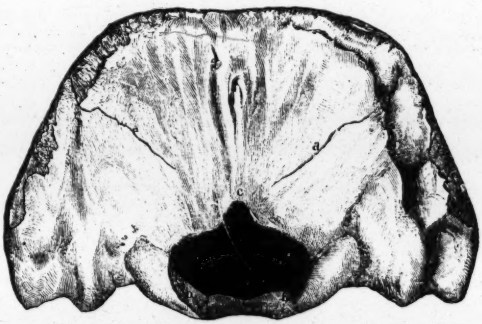
Fig. 1.



Skull of Broad headed Wombat, upper surface.

side is very distinct. This bone is perfectly separate from the supra-occipital; but in Dr. Murie's specimen, if I may judge from the plate (*l. c.* p. 844, fig. 1), it was ossified to the occipital. The temporal crests are not so much raised posteriorly as represented in Dr. Murie's plate; and the sagittal suture is neither so deeply nor so regularly toothed. Two exceedingly curious Wormian intercalary

Fig. 2.



Skull of Broad-headed Wombat, back surface.

bones occupy the anterior seven lines of the suture, the entire length of which measures 1 inch 4 lines. The large holes in the squamosal are very like those in Dr. Murie's woodcut; they are more numerous (eight) on the right side, and only six on the left. The occipital crest is more distinctly curved in my specimen than in his. The frontal bones are rounded at their coronal ends, the line of the suture being distinctly convex backwards. The anterior sagittal Wormian bone projects forwards into this suture, and articulates with another of these remarkable sutural bones, which exists in the frontal suture at its posterior border, extending for 5 lines between the frontal bones. In front of this the suture stretches for 5 lines, when it is again interrupted by another Wormian bone, a long thin slip, $1\frac{1}{2}$ line broad and $8\frac{1}{2}$ lines long. This bone, however, is on the surface of the suture merely, and does not penetrate into the entire depth of the interspace between the frontals; in front of it the frontal suture extends for 7 lines. The supraorbital portions of the frontal bones are very much raised and rough; and the alisphenofrontal suture extends to the postorbital process on the left side, but is nearly obliterated on the right. A spur of the frontals is continued forwards in the middle line between the nasals: this is longer (4 lines) and sharper on the left, smaller (2 lines) on the right. There is no appearance of this "snibb" in any of the other crania; and it is interesting to find such a process springing from two ossific

centres, as the presence of a similar beak in the parietal bones of scaphocephalic human crania has been used as an argument in favour of Minchin and Von Bär's theory of a single biparietal ossific centre in such cases. The nasals are flat, and project rather further in front of the intermaxillaries than in Dr. Murie's specimen. A thin nasal lamella of the maxillary bone ascends between the nasals and the lachrymal to the anteorbital process of the frontal. The pterygoid bones are separate on each side; and the ossified ligamentum pterygo-spinosum of Civinini is strong and sharp. The sutures between the basioccipital and the basisphenoid, as well as that between the latter and the presphenoid, are widely open. The large rough tubular tympanic is quite loose, and the deep supratympanic fossæ are very large. On one side the malleo-incudal bone remained; and I have made of it the appended sketch (fig. 3).

Fig. 3.



Malleo-incudal bone, front and back surfaces.

The drawings (figs. 1 & 2) accompanying show the principal points of interest herein noted.

2. On the Imperial Eagles of India. By W. E. Brooks, C.E., Etawah. (Communicated by the Secretary.)

[Received March 4, 1872.]

It has been supposed by many that the Indian Imperial Eagles were all referable to one species, which, again, was identical with the European bird.

The European species, however, the true *Aquila imperialis*, Bechst., is quite distinct from our Indian birds, as Mr. Howard Saunders has recently shown in the Society's 'Proceedings' (P. Z. S. 1871, p. 37).

The young of the European bird is of a plain tawny brown, and is never lineated. The old bird differs from our Indian species in having white *on the ridge of the wing*, as well as white scapular feathers. Neither of our Indian birds can, therefore, any longer retain the name of *imperialis*.

There are four stages of Imperial Eagle found in India and the East generally. These have been referred to one species by Dr. Jerdon and others, but were kept separate by Mr. Hodgson.

They belong to two distinct species, *Aquila crassipes*, Hodgson, and *Aquila bifasciata*, Gray and Hardwicke.

The former (*A. crassipes*) has three well-marked stages:—

1st. Light brown plumage, lineated both above and below. Each feather possesses a light fulvous central stripe. The tail is, as a rule, plain dark brown with a light tip; and it is not barred.

2nd. A very dark, black-brown plumage, both above and below, save the upper part of the head and nape, which are buff or fulvous. The tail changes to blackish brown, or nearly black, the upper part being barred with grey, *and the end having a broad 4-inch band of black*. The top of the head has also generally a patch of brown.

3rd. The same as the second stage, with the addition of snow-white scapulars, to a greater or lesser extent.

I am correct in stating that the striped bird passes directly to the old black-brown bird with light head, and am not advancing a theory of my own; for Mr. Anderson, of Futtehgurh, has shot two half-changed birds, which he has kindly lent to me. These have numbers of the lineated feathers still remaining intermixed with greater numbers which are black-brown. I believe a change of colour in these feathers takes place without a moult. The tail of one bird is partly changed (by a moult) to the adult tail with grey bars and dark terminal band.

Our second species (*A. bifasciata*) appears only to have *two* well-marked stages.

1st. The whole bird is a very pale dull grey-brown, sometimes speckled slightly with fulvous on the abdomen. There are two broad fulvous wing-bars, formed by the broad light tips of the greater coverts and those of the secondary quills. The tail has also a light tip, and is generally slightly barred with hoary grey.

2nd. The very pale brown changes to a rather darker brown (which is still but a dull light-toned brown compared with that of mature *A. crassipes*); the wing-bars disappear, and the tail is *strongly* marked with wavy grey bars on a dark brown or black ground. There is no dark terminal band, *but the barring is continued to the end of the tail.*

The only further change towards maturity in this Eagle which I have seen, is, that the back of the head and nape of the neck become buff-coloured or fulvous. The head then resembles that of the mature *A. crassipes*; but the brown of the body is not half so dark, being a sort of earthy brown, "soil-brown," as Mr. Hodgson expresses it.

Mr. Hodgson has two drawings of this Eagle—one in the first stage (typical *A. bifasciata*), and the other in what I take to be the mature bird with buff nape. He has another drawing, termed "*A. nipalensis*," which is clearly intended to represent a very pale example of *A. bifasciata* in its first stage. I possess a bird almost as pale.

He has two drawings of the striped bird which he terms "*Aquila crassipes*;" and I know of no other name which this Eagle bears. The drawings are remarkably accurate.

In coming to the conclusion that we had two Indian Imperial

Eagles, I had the use of a very fine series, formed of Mr. Anderson's birds as well as my own. This collection, numbering between 30 and 40 birds, is, I believe, the finest there is; for I have not heard of even Mr. Hume possessing the half-changed striped birds. It was very pretty to see how this striped bird changed gradually into the old black one, and to see, on the other hand, how remarkably distinct *A. bifasciata* was from *A. crassipes* in every stage. Beyond the fulvous on the back of the head the two birds have nothing in common, except that they are of very similar size.

3. On the Genus *Chelymys* and its Allies from Australia. By Dr. J. E. Gray, F.R.S. &c.

[Received February 28, 1872.]

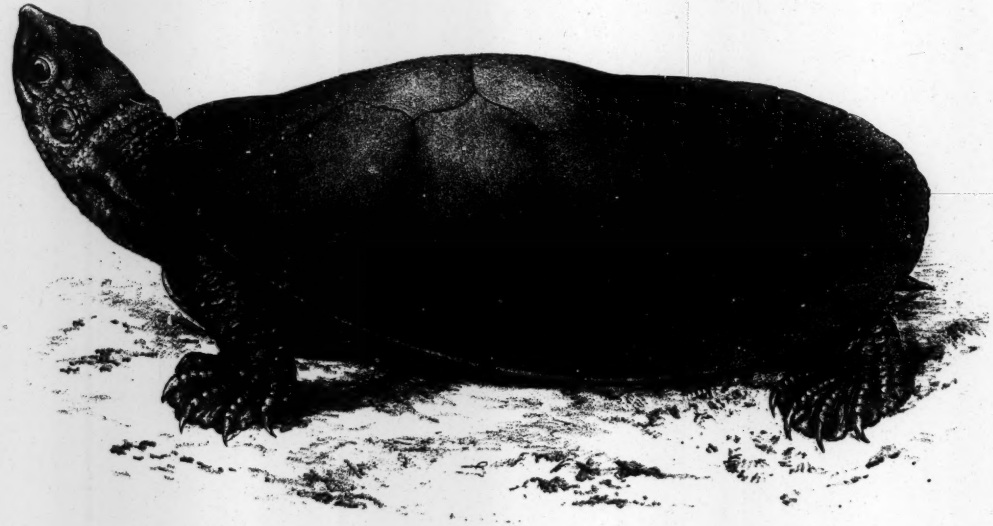
(Plates XXVII.–XXIX.)

Chelymys of Australia, in its more extended sense, forms with *Platemys* from Tropical America a group differing from all the other *Hydraspidæ* in having a solid skull with a broad square face and crown, with the temporal muscles on the side, and a broad auri-occipital arch. The American genus *Platemys* is somewhat like the Australian genus *Elseya*, but differs from it in many particulars sufficiently to show that it is a distinct genus.

For many years only a single species, called *Emys macquaria* by Cuvier, was known; but as the country has been more searched we have gradually become acquainted with several very distinct species, which in the 'Annals and Magazine of Natural History' for 1867 (vol. xx. p. 44) I separated into two genera, *Chelymys* and *Elseya*, the former having no beard on the chin, whilst the latter has two distinct beards, but no nuchal shield.

In the 'Annals and Magazine of Natural History' for 1871 (viii. p. 117) I separated the genus *Euchelymys* from the latter because it had a narrow nuchal shield as well as two beards. We have since received from Mr. Krefft several more specimens of these animals—which has induced me to revise the characters of these genera, and also to examine and figure the skulls of two of them, as well as the other parts of the skeleton. I am now in doubt whether the existence of a narrow nuchal plate is a sufficient character for the establishing of a genus or species; but I must leave this question to be solved by the discovery and examination of more specimens. As yet we have only a single specimen with a nuchal plate; and, as far as I have had an opportunity of judging, I think it may probably be an accidental malformation of a comparatively common species without a nuchal plate, of which there are several specimens in the Museum collection.

The Australian genera have solid, rather thick, skulls, unlike the

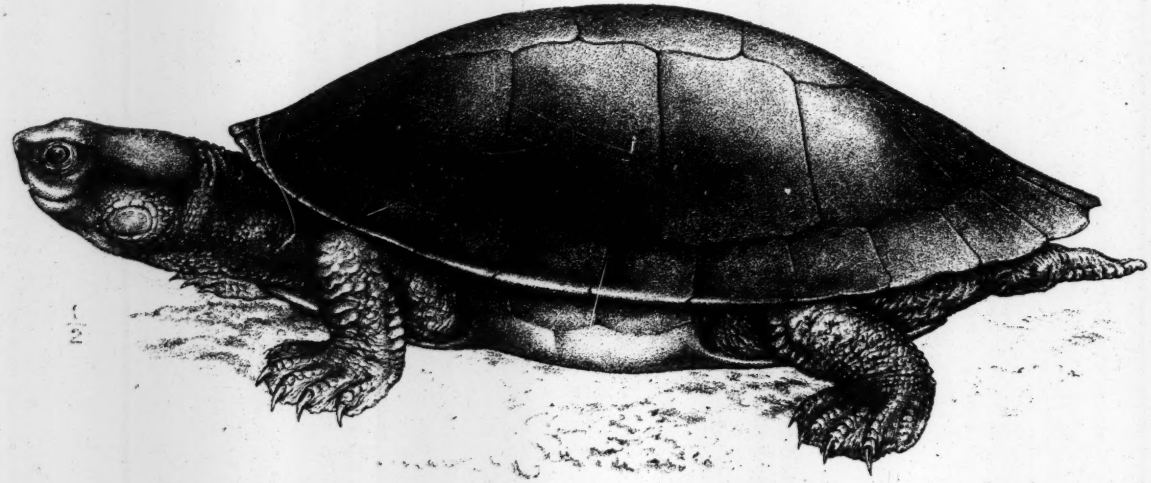


C. Berjeau del et lith.

Mintern Bros. imp.

CHELYMYS VICTORIÆ.

BRITISH
280C73
MUSEUM



C. Bergeon. del. & lith.

Mintern Bros. imp.

CHELYMYS KREFFTII.

BERLIN
ZOOL.
MUSEUM



C. Berjeau del. et lith.

Mintern Bros. imp.

ELSEYA LATISTERNUM

BRITISH MUSEUM
2806.73

thinner skulls of the American genus *Platemys*. They may be divided thus:—

I. *Head covered with a skin, which is reticulated over the temples; nuchal plate distinct; neck smooth, reticulated.*

1. CHELYMYS. Chin not bearded; nuchal plate generally broad; occiput like the crown. (Fig. 1, p. 505, skull.)

2. EUCHELYMYS. Chin two-bearded; nuchal plate narrower; sides of occiput with two oblong, subtriangular, diverging, hard plates.

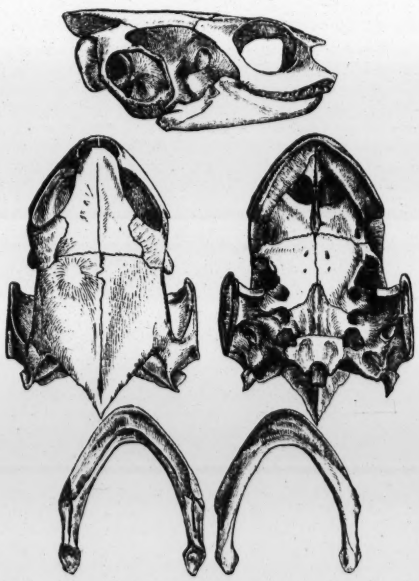
II. *Head and temporal muscles covered with a hard bony sheath; nape spinose; chin two-bearded; nuchal plate none (or, rarely, very small and narrow).*

3. ELSEYA. (Fig. 3, p. 507, skull).

1. CHELYMYS.

Head covered with a smooth skin, reticulated and divided into

Fig. 1.



Skull of *Chelymys victoriæ*.

small plates over the temples. Chin without any beard; nape smooth, reticulated; legs with small scales. Nuchal shield broad and well developed. Crown and occiput nearly square, scarcely dilated behind; hinder edge produced in the middle. Vertebral shields of the adult quite as long as broad.

Skull depressed, without any zygomatic arch, and with a large tympanic opening; forehead and crown broad, flat, produced behind in the middle of the occiput. Basisphenoid transverse, shorter and broad, with a triangular projection on the front edge, produced behind the hinder part of the palatine bones. The basioccipital oblong, transverse, as broad as the sphenoid.

I am inclined to think that more than one species were included under the name of *Chelymys macquaria* in the Catalogue and Supplement, some even belonging to what is now regarded as another genus, as they have two beards, which were overlooked in the stuffed specimens.

* *Thorax ovate, more or less depressed, with the hinder margin expanded. Head of moderate size.*

1. CHELYMYS MACQUARIA. B.M.

Emys macquaria, Cuvier, R. A. vol. ii. p. 11.

Hydraspis macquaria, Gray, Synopsis Rept. p. 40.

Emydura macquaria, Bonaparte, Tab. Analyt. p. 8.

Platemys macquaria, Duméril and Bibron, Erpétol. Générale, & Cat. Méth. p. 21.

Chelymys macquaria, var. 1, Gray, Cat. Shield Rept. p. 57.

Hydraspis australis, Gray, in Gray's Travels in Western Australia, vol. ii. p. 445, tab. vi.

Hab. Australia, Macquarie River (*Gould*, 1840).

The species was originally named by Cuvier from a specimen in the Paris Museum said to have been brought from the Macquarie River by MM. Lesson and Garnot; and the first four names quoted are derived from this specimen. I am inclined to suppose that Mr. Gould's specimen, which I described in Capt. Gray's narrative, may be the same species, as it is from the same river.

2. CHELYMYS VICTORIÆ. (Plate XXVII.) B.M.

Hydraspis victoriæ, Gray, Zool. Misc. p. 55.

Chelymys macquaria & var., Gray, Cat. Shield Rept. p. 57; Suppl. Cat. Shield Rept. p. 76, fig. 25 (head); P. Z. S. 1856, p. 31.

Var. 1. Shell depressed, expanded.

Var. 2. *marmorata*. Back more solid and convex, marbled.

Var. 3. *sulcata*. Back with a central groove, shields obscurely longitudinally grooved.

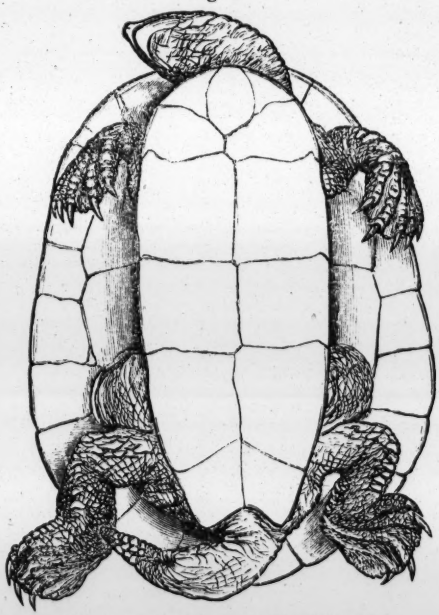
Hab. N.W. coast of Australia, Victoria River (*Capt. W. Chambers, Mr. Gould*); east coast of Queensland, Burnett River (*Mr. Krefft*).

This species appears to have a very extensive geographical distri-

bution. There are several specimens in the British Museum brought from the Victoria River by Capt. William Chambers and Mr. Gould, and more lately several specimens in spirit from Burnett River on the east coast of Queensland. It is remarkable that the specimens received at the same time from the Victoria and Burnett rivers present such variarion in form that one is induced to believe that they are referable to two species. Having only one or two specimens of the one from the Macquarie River, we have not the means of deciding whether the same variations occur in that river.

The specimens agree in having a lead-coloured head, with a broad streak from the middle of the hinder part of the orbit to the upper front margin of the tympanum, and a similar, rather broad, streak from the angle of the mouth to the underside of the tympanum.

Fig. 2.



Chelymys victoriæ, from Krefft's photograph.

In general the gullet and throat below this line are white; but in some they are more or less varied with lead-colour. The thorax in all the specimens is much more oblong and convex than in the specimens received from Segou, on the Macquarie River; but they vary

both in the outline of the thorax and in the convexity of the back very considerably. The smallest is the broadest, with the back of the shell much elevated in the centre. Indeed no two of the specimens are alike in form and convexity, which induces me to believe that they all belong to one variable species.

*** Thorax oblong, convex, high. Head large.*

3. CHELYMYS KREFFTII. (Plate XXVIII.) B.M.

Thorax oblong, scarcely broader behind, very convex. The second, third, and fourth vertebral shields as long as or rather longer than broad; the second and third nearly square, with only a slight angle near the middle of each side; the fourth contracted behind; the first nearly square, rather broader than long, and rather broader in front. Thorax convex, elevated from the margin, the lateral processes convex. Head large, above olive, with a broad white streak from the back of the orbit to the upper front margin of the tympanum; a broad white streak from the angle of the mouth to the lower part of the tympanum. Beaks very strong and convex. Upper part of neck slightly granular.

Chelymys krefftii, Gray, Ann. & Mag. Nat. Hist. 1871, viii. p. 336.

Hab. Burnett River.

One specimen (Krefft's MS. no. 9) is coloured very much like the others received from Mr. Krefft, but differs in being oblong and very convex, instead of being broadly ovate and much more depressed, and in the form of the vertebral plates. It also differs in having a much larger head compared with the size of the body.

It has been suggested that this may only be a difference of sex; but it is very curious that, out of a large series, it should be the only one of the sex that has come to us.

2. EUCHELYMYS.

Head covered with a continuous soft skin, which is reticulated over the temporal muscles, with an oblong, triangular, diverging hard plate on each side of the occiput. Chin with two beards. Back of the neck netted, slightly tuberculated or convex. Forehead and crown nearly square, scarcely dilated behind; hinder edge of occiput scarcely sinuated. Thorax convex, solid; cavity contracted in front; nuchal shields narrow, well developed; vertebral shields broad, the fifth as broad as or broader than the others. Fore legs with large transverse scales in front and with keeled scales on the outer margin.

Euchelymys (part.), Gray, Ann. & Mag. Nat. Hist. 1871, viii. p. 118.

I first established this genus in the 'Annals and Magazine of Natural History' for August 1871, placing the two species together, because they both had nuchal plates; but I believe now that the second species was founded on an abnormal specimen of *Elseya*.

EUCHELYMYS SULCIFERA. B.M.

Thorax dark olive-brown, marbled with white below; vertebral shields irregularly longitudinally sulcated, with a central continued longitudinal groove; neck slightly warty above, dark olive, with a white streak from the angle of the mouth under the ear on each side.

Chelymys macquaria, var., Gray, P. Z. S. 1856, p. 371; Ann. & Mag. Nat. Hist. 1863, xii. p. 98; Suppl. Cat. Shield Rept. p. 75.

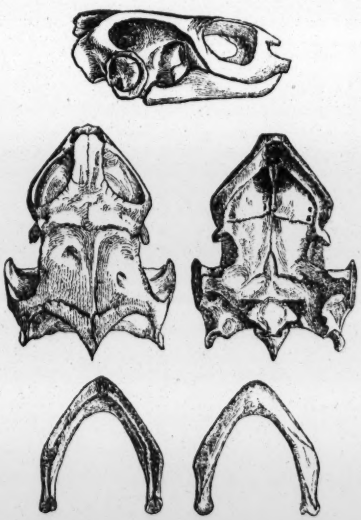
Euchelymys sulcifera, Gray, Ann. & Mag. Nat. Hist. 1871, viii. p. 118.

Hab. North Australia (*Stutchbury*, 1856).

3. ELSEYA.

Head covered with hard shields, which are incompletely divided into five large frontal and temporal plates; the nasal and frontal united, and with a small triangular central plate. The hinder part of the

Fig. 3.



Skull of *Elseya latisternum*.

top of the head much wider than the front; the hinder edge rather sinuated on each side. Temporal muscles moderate, covered with reticulated scales. Chin with two beards. Back of the neck covered

with a few tubercles. Thorax depressed, dilated and reflexed on the side. Nuchal shield none (or abnormally very small and narrow). Fore legs with a few transverse scales.

The skull of *E. latisternum* depressed, broader behind; forehead and crown flat to the occiput, broad, becoming wider behind; the tympanic cavity rather produced, of moderate size; basisphenoid short, broad, transverse, with a small tapering central lobe in front, produced between the hinder part of the palatine bones. The basi-occipital about as broad as long, rather lozenge-shaped, the front edge being rather arched, not so broad as the basisphenoid.

α. Front lobe of the sternum broad, with a subcircular outline, as broad as, or broader than, the hinder lobe.

1. ELSEYA LATISTERNUM. (Plate XXIX.) B.M.

Front of the sternum broad, much broader on the hinder part, with a rounded outline; nuchal plate none; intermediate plate moderate.

Elseya latisternum, Gray, Ann. & Mag. Nat. Hist. 1871, viii. p. 292.

Var. 1. Underside of the shell pale yellow, rather darker on the margin of the shields. There are two specimens of this variety in the British Museum, from Cape York, North Australia, which were described in the 'Ann. & Mag. Nat. Hist.' for July 1867.

One of these specimens is peculiar for having a small linear extra shield on each side, on the outer part of the abdominal shield, which is unusually short in this specimen. To judge by the thickness and size of the tail, the two specimens appear to belong to two different species.

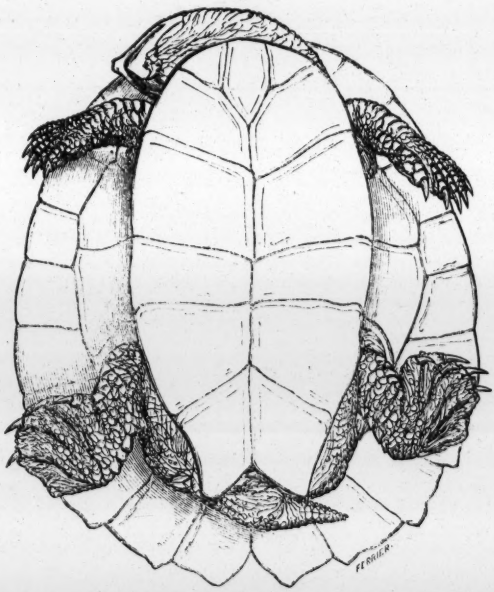
Var. 2. This differs in the sternum being pale greyish white, more or less marbled with dark brown. Two specimens of this variety were received from Mr. Krefft, who obtained them in the Burnett River, Queensland. They are exceedingly like the single specimen of *Euchelymys spinosa* in the British Museum; but they both have no indication of the narrow nuchal shield observed in that specimen. These are the specimens described in the 'Ann. & Mag. Nat. Hist.' 1871, vol. viii. p. 292.

Var. 3. The underside dark, blackish; the lower margin reddish, with black edges to the shields. There are two specimens of this variety received from Mr. Krefft. One is the largest example of the species that I have seen. The dorsal shields are rather rugose, with regular linear pits and more elongated grooves. The dorsal line is sunken. The head is covered with a uniform hard shield, which is slightly sinuate on each side of the hinder margin. With this specimen was received another, about two-thirds the size (indeed rather more convex than the other species of the genus in the Museum), which is peculiar for having thirteen marginal shields on each side, six forming part of the margin of the last vertebral plate (see Plate XXIX., animal); there is no doubt that this arises from the division into halves of the usual caudal shield; but they

are remarkably regular, and, curiously enough, each of these shields is bidentate at the apex. The last vertebral shield is much larger and wider; but they all vary a little in the size of the shield, which is comparatively smallest in the largest specimens.

A young specimen from Cape York, North Australia, has the vertebral shields short and much broader than long; the upper part of the thorax is dark olive, the underside white, varied with more or less broad brown lines on the sutures of the marginal and sternal shields; the head olive, with a paler streak from the nostrils over the eyes to the side of the occiput; beneath, the throat and sides of the neck white, including the lower half of the tympanum; a blackish margin to the lower edge of the lower beak, becoming broader behind and extending along the sides of the neck; the beards white.

Fig. 4.



Elseya latisternum, from Krefft's photograph.

There is a very young specimen in the British Museum which probably belongs to this species; it has *four* beards—that is, the front pair in the usual place and the hinder rather behind it, both pairs being placed along the concavity of the lower jaw on the line of insertion of the skin. I do not know if this is to be regarded as a monstrosity

of the young of this species, or as indicating the existence of a peculiar species of which as yet we have received but one specimen.

2. ELSEYA SPINOSA. B.M.

Front of the sternum broad, much broader on the hinder part, and with a rounded outline; intermediate plate broad; nuchal plate very narrow and small.

Euchelymys spinosa, Gray, Ann. & Mag. Nat. Hist. 1871, viii. p. 118.

Thorax broad, rounded in front, above brown varied with black; beneath pale brown marbled with black.

Hab. North Australia (1866).

Only a single specimen of this species has been received, and it is so like some specimens of *E. latisternum* that it may possibly be an example of that species accidentally possessing a nuchal plate.

3. ELSEYA? INTERMEDIA. B.M.

The front lobe of the sternum rather wider than the hinder one, regularly rounded; the hinder lobe with straight sides in front, and contracted in the hinder half; nuchal plate none.

Elseya dentata (adult), Gray, Suppl. Cat. Shield Rept. p. 76.

Hab. North Australia, upper part of Victoria (*Dr. J. Elsey*).

This shell is very like a very old specimen of *Elseya dentata*; but I prefer to describe it separately until we get more examples.

The thorax (which is without any remains of the animal) is ovate, very solid and convex; the hinder margin is dilated and much wider in front, and much reflexed on the sides. Nuchal plate none. Second marginal plate on each side wider than the rest; the first vertebral plate five-sided, produced on the front of the inner margin; the second, third, and fourth vertebral plates four-sided, rather sinuated on the side of the margin; the second and third rather more than half as long again as broad; the fourth much narrower, twice as long as broad; the fifth triangular, broader than long. The sternum dark brown, with irregular white marks in the centre. The intergular plate moderately broad. The gular plates small, triangular; postgular plates moderate, narrowed on the inner edge; the pectoral and other plates large.

The front vertebral plate five-sided, rather angularly produced in front, considerably broader than long. The second, third, and fourth are six-sided, longer than broad, the fourth being narrowest and longest, and each having a more or less distinct central prominence near the hinder edge. The bones of this specimen are well-knit, and do not show the signs of youth.

β. Front lobe of the sternum narrow, narrower than the front part of the hinder lobe; the sides of the front part straight, divergent.

4. ELSEYA DENTATA. (Fig. 5.) B.M.

The front lobe of the sternum narrow, with the sides nearly straight,

rapidly converging in front; the gular shields very narrow, elongate; intermediate plate, small, linear; nuchal plate none.

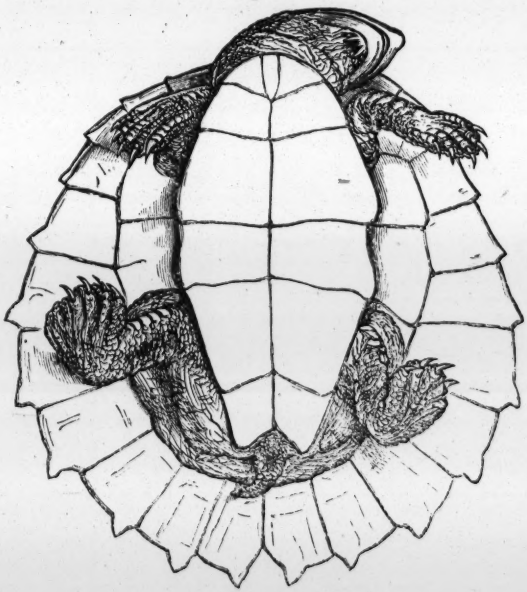
Elseya dentata, Gray, Ann. & Mag. Nat. Hist. 1867, xx. p. 44; Suppl. Cat. Shield Rept. p. 76.

Hab. North Australia, Upper Victoria (*presented by Dr. John Elsey*).

There is a specimen of the shell of this animal in the British Museum without any part of the animal. Therefore we do not positively know that it belongs to this genus; but it agrees with it in having no nuchal plates and in having the hinder margin sinuated.

The shell is much more dilated on the hinder margin, has the margins of the ribs separate, and a considerable hole covered with membrane in the centre of the sternum. The vertebral plates are all much longer than broad, the second and third being broadest, with an obscure tubercle; the fourth is nearly as long as broad, and keeled.

Fig. 5.



Elseya dentata, from Krefft's photograph.

Dr. Krefft has sent me a photograph of the underside of the animal in spirit of this species, showing the existence of two chin-beards,

which appear nearer together and more in front than in *Elseya latisternum*; but as yet I do not know the upper surface of the head.

4. Descriptions of new Land and Freshwater Shells from the Khási, North Cachar, and Nágá Hills, N.E. Bengal. By Major H. H. Godwin-Austen, F.R.G.S., F.Z.S., &c., Deputy Superintendent, Topographical Survey of India.

[Received March 18, 1872.]

(Plate XXX.)

1. Melanoides spinata, sp. nov. (Plate XXX. fig. 1, 1 *a*, operculum.)

Shell angularly turreted; colour olive-green; spire acute, rather rapidly decreasing in diameter; apex eroded; suture marked by a distinct cord continuous with that on the lower angle of the last whorl; whorls 5-6 (there would be 8 if perfect), very convex and flattened on the periphery, with strong tubercles arranged in two parallel longitudinal rows, the spines being rather longer on the upper; aperture ovate, vertical, well channelled at the base, a thin milky callus on the columellar margin, within pale grey with two or more bands of brown coinciding with the rows of spines and the corded surface of the outer base.

Operculum paucispiral, nucleus subcentral.

Animal 1·4 in. long; foot round and large, not angular in front; colour grey, mottled with ochre; body also grey, the ochre markings showing as streaks; tentacles very short, 0·4 inch.

Length 2·20; diam. 1·15; apert. alt. 0·95, apert. lat. 0·60 inch.

Hab. Kopili river, North Cachar hills, a tributary of the Bráhmapūtra.

Proportion of aperture to body-whorl ·95 to 1·35, or 2 to 3.

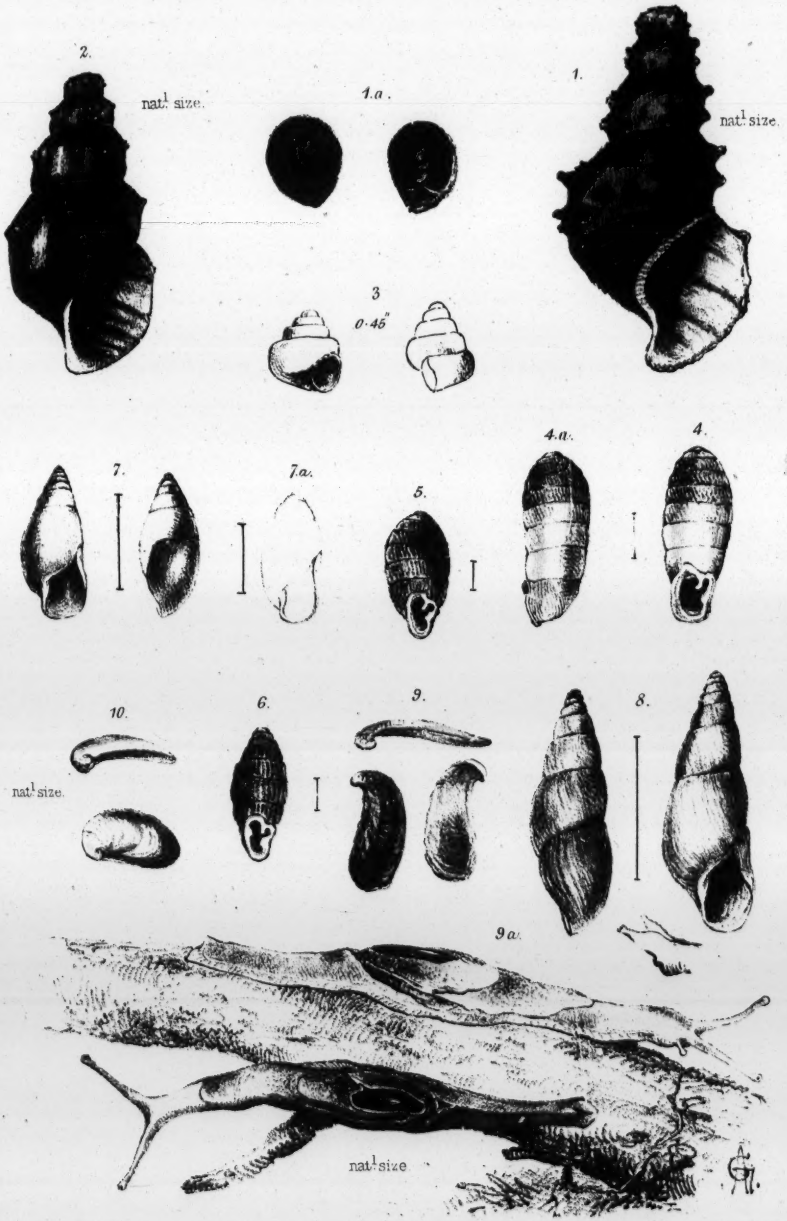
I find this shell exceedingly abundant in the deep still pools of the Kopili river, associated with a very large variety of *Pal. stephanus*, Bs.

2. Melanoides hanleyi, sp. nov. (Plate XXX. fig. 2.)

Shell turreted, colour rich dark chestnut-brown; spire rather acuminate, rapidly decreasing; apex eroded; suture impressed but slightly, but strongly marked; whorls 5 (without the apical), flat, sharply angular above with a single row of well-defined small tubercles on the angular margin; body-whorl large, well rounded below, distinctly corded at base near the columellar margin; aperture vertical, ovate, very slightly effused at base; within pale grey, with three or more red-brown bands.

Length 1·8; diam. 0·95; apert. alt. 0·70, apert. lat. 0·50 inch.

Hab. Diyūng river, North Cachar hills.



H.H. Godwin-Austen, del. et lith.

Vincent Brooks, Day & Son, Imp.

NAGA and KHASI HILL SHELLS.

BRITISH
2806c73
MUSEUM

Proportion of mouth to body-whorl, 7 to 11½.

I name this shell after that zealous conchologist Mr. Sylvanus Hanley, who was the first to notice the distinctness of this species when looking over my collection of Melaniadæ from the Khasia ranges. Several specimens were found.

3. HYDROCENA MILIUM, Bs. (Plate XXX. fig. 3.)

I have had an opportunity of examining the type specimen of this shell in the collection formed by the late Mr. Benson, and of making a drawing of it, which I now give. The impression formed on seeing it was one of doubt as to its being an *Hydrocena*, it had so much the appearance of an immature *Pupa plicidens*, Bs. The examination of a large number (several dozen) in different stages of growth, rather confirmed the impression first formed. In the young of *P. plicidens*, even before the teeth are formed, the peristome is continuous, as it is in *H. milium*; the whorls agree in number; and the striation is similar. The size of Benson's *H. milium*, however, is extremely small when compared with *P. plicidens* taken from the limestone rocks. This last shell, from Mussoorie, is of smaller size; and the species under review may be only a dwarf variety taken upon the sandstone rocks near Mausmai, in Khasi Hills. Its right to rank as a new genus should be considered questionable until other specimens shall be found, and the animal and operculum examined and fully described. The specimen described as a new genus is, moreover, old and much worn. For days during the height of the rains I had a collector employed round about Mausmai and Cherra Poonjee, and have searched for it myself; but I never succeeded in finding this *Hydrocena*, which of course I only then knew from description. *Hydrocena*, or rather *Acicula tersa* is locally very abundant and was soon rediscovered.

4. ENNEA BLANFORDIANA, sp. nov. (Plate XXX. fig. 4.)

Shell cylindrioid, pale corneous, solid, last whorls polished and glassy, apex white; spire elongate, sides flat, slightly tapering towards the base, markedly swollen towards the apex, which is rounded and blunt, suture shallow; whorls 8, the last four smooth with very minute striation, the upper sculptured with close, fine, subvertical ribbing, the body-whorl contracted at base; aperture oval, vertical, peristome thickened, expanded, deeply sinuated on the upper outer margin, thickened upon the contraction of the body-whorl into a bidentate form; parietal callus thick and ascending.

	inch.		Small variety. inch.
Length	0·32	.....	0·23
Diam.	0·11	.....	0·10
Apert. alt. with peristome	0·08	.....	0·065

Hab. Máhádeo Peak, near Asálú, North Cachar hills, among rocks at 5700 feet. The smaller variety on Hemeo Peak in the same district and at the same elevation.

In this pretty new form the mouth has all the characters of *Ennea vara*, Bs., of the Khasi Hills; its nearest ally is *E. stenopylis*, Bs.; the difference, however, is strong as regards the shorter form of the last named, its small, more contracted aperture and well costulated whorls. I have, for the sake of comparison, given drawings of these allied forms (figs. 5 and 6), to show the relative differences of the three known species from the Khasi range of mountains.

5. Bulimus (Harpalus) khasianus, sp. nov. (Plate XXX. fig. 7.)

Shell subperforate, ovately turreted or acutely ovate, thin, diaphanous, fresh specimens often glassy, becoming dull white or pale straw-colour with age; minutely striated under lens; spire conical, apex blunt, suture moderate; whorls 6–7, slightly convex, the body-whorl large and tumid; aperture vertical, semioval; peristome simple, sharp, rounded and arched considerably forward at the upper angle; the columella is curved forward from behind, and the margin slightly reflected.

	Large sp. inch.		Cherra-Poonjee sp. inch.
Alt.	0·59		0·41
Diam.	0·28		0·20
Apert. diam	0·16		0·12
Apert. alt.	0·29		0·23

Animal with a short foot pointed behind, pale yellow tint; eye-tentacles dark to the base, lower very short.

Hab. Khási, Jaintia, and Nágá Hills, in deep shady forest among decaying wood and leaves at the foot of trees.

It appears to be very close to *Bul. putus*, Bs. (Annals and Mag. Nat. Hist., April 1857) from Tavoy. Specimens differ very much in size from different collections. The shell is very finely developed in the high parts of the North Cachar hills at 6000–7000 feet (fig. 7). At Cherra Poonjee it assumes a more tumid form (fig. 7, *a*), and it is very frequently dwarfed to the length of only 0·36 inch, especially in its lower habitats; but these variations are not of sufficient specific importance.

6. Bulimus (Harpalus) munipurensis, sp. nov. (Plate XXX. fig. 8.)

Shell rimate, elongately turreted, thin, covered with a pale ochre or straw-coloured epidermis, and strongly and obliquely striated; spire turreted, apex blunt; whorls $7\frac{1}{2}$, convex, suture strongly impressed; aperture oblique, rounded below, milky white inside; peristome acute, outer and upper margin arched well forward; columellar margin straight, strong, and slightly twisted forward; a thin white callus on the parietal margin. Animal pale orange, fainter tint above the head; foot short; eye-peduncles short, swollen at the base, lower tentacles very short blunt projections.

Alt. 0·88; diam. 0·30; apert. alt. 0·35, apert. lat. 0·17 inch.

Hab. I found this species high up on Hengdan Peak, 7000 feet on the Munipúr boundary, among dead leaves in forest. I have placed the last two species in the subgenus *Harpalus* of Albers, after comparison with *H. grateloupi*, Pfr., from Luzon, and *H. guineensis*, Jones. In *Subulina* the notch is hidden and rounded; and to this should, perhaps, belong Benson's genus *Spiraxis* (properly a West-India form). I have an undescribed species from the Nicobar Islands, found by Mr. Ferd. Stoliczka, and provisionally named *Spiraxis*; but in the form of the aperture it is precisely similar to *H. munipurensis*, as well as in its other characters.

The genus *Spiraxis* of Benson differs in the form of the aperture from the above, and is a far more solid shell, if *Sp. houghtoni* be taken as the type. In this last species we find an approach in some of its characters to *Achatina casiaca*, Bs.*

7. HELICARION (HOPLITES?) CROCEUS, sp. nov. (Plate XXX. fig. 9, 9*a*.)

Shell very flat, rudimentary, oblong, thin, horny, transparent, pale yellow-green, with a longitudinal band of dark green, most intense on the outer margin, extending from near the pale-coloured apex to the edge of the peristome; spire very short, apex flatly curved; peristome membranous, very thin, transparent; within the single body-whorl the colour is pale milky with some blue reflections.

Diam. major 0·75, minor 0·35 inch.

Animal is of a fine bright saffron-yellow colour; when contracted it has a richer gamboge tint; mantle mottled with pale yellow; a narrow edging of yellow extends round that portion of the mantle covering the shell; another narrow band extends from the posterior left side of the mantle towards the anterior left side, fining out and terminating about $\frac{3}{8}$ inch from the edge. From the posterior right side a short line of yellow extends as far as the respiratory orifice; outside edge of foot very pale yellow, and almost white below; extremity of foot truncate, with a gland as in *H. gigas*. Length of animal $2\frac{1}{2}$ to 3 inches; tentacles pale yellow, 0·45.

This very handsome species is very abundant during the height of the rains in the valleys below Cherra Poonjee; and in the living animal the small portion of shell not hidden by the mantle-lobes is of a jet-black colour.

8. HELICARION (HOPLITES?) THEOBALDI, sp. nov.

Animal of a pale yellowish dull grey, under surface of foot pale light yellow. The mantle-lobes completely cover the shell; a white stripe extends from the posterior side forward along the edge of the left lobe; and a like narrow white stripe from the hinder part of the

* I may mention that the type of *A. casiaca* in Benson's collection is a shell I obtained in the Nágá Hills, but never in the Khási. The form in the latter, western locality is very distinct, much larger, more solid, and has not the well-marked brown epidermis of *A. casiaca*. The Khási species is much closer to *A. obtusa*, W. Blf., and requires figuring and describing; this I hope to do on a future occasion.

mantle is continued to the respiratory orifice on the right side. The animal is in all points of structure similar to *H. croceus*, last described, but larger by ½ an inch; the shell is very rudimental, major diam. 0·56, minor very narrow; the apex is well developed and more calcareous, the rest of the shell being a mere thin horny epidermis of a pale green colour.

Although the description of *Helicarion* agrees fairly with the animal of these Khási forms, yet I am not satisfied they are generically the same, in which case the genus *Hoplites*, Theobald, will stand. I have named the above shell after Mr. Theobald, of the Geological Survey of India, who was the first to notice this form of slug; but as I cannot find any description, I presume that the species now referred to was the one he discovered, for it is very abundant all over the hills even in the winter months. Other smaller species exist; but I am sorry that I neglected, or had no time, to draw them when taken; and they do not survive long.

The largest form in the Khási hills is *Helicarion gigas*, Bs., described as a *Vitrina*. Of the largest specimen I obtained the animal measured 4 inches in length; shell, major diam. 1·7 inch, minor diam. 1·2 inch.

9. Helicarion (Hoplites?) solidus, sp. nov. (Plate XXX. fig. 10.)

Animal not seen.

Shell flat, periphery oval, solid; epidermis reddish brown; spire short, apex very flat; one single body-whorl; peristome simple, thin.

Diam. major 0·57, minor 0·32 inch.

This shell was found at Hengdan Peak, North Cachar hills, and on several occasions during the cold season; but I never obtained a living specimen. I have, however, figured the shell, with the hope that a description of the animal may some day follow.

EXPLANATION OF PLATE XXX.

Fig. 1. *Melanoides spinata*, nat. size.
1*a*. Operculum of ditto.
2. *Melanoides hanleyi*, nat. size.
3. *Hydrocena milium*, Bs.: *qu.* young of *Pupa plicidens*, Bs.?
4. *Pupa* (*Ennea*) *blanfordiana*.
5. —— *stenopylis*, Bs.
6. —— *vara*, Bs.
7, 7*a*. *Bulimus* (*Harpalus*) *khasianus*.
8. —— (——) *munipurensis*, with head of animal.
9. *Helicarion* (*Hoplites*?) *croceus*, nat. size.
9*a*. Animal of ditto, nat. size.
10. *Helicarion* (*Hoplites*?) *solidus*, nat. size.

5. On the Introduction of *Anser albatus* of Cassin into the British Avifauna. By Howard Saunders, F.Z.S.

[Received March 18, 1872.]

On the 9th November last my attention was called to two Geese in Leadenhall Market; and subsequently I purchased them, one for Mr. R. B. Sharpe, and the other for myself. They had both been recently shot, the blood and slime being still moist in the wounds, bill, and nostrils. The vendor, with whom I have dealt for some years, did not pretend to know any thing about the locality where they were obtained, but referred me to the wholesale dealer from whom he had purchased them. This dealer, Mr. Miller, at once showed me the invoice, specifying so many head of poultry and "two birds" forwarded to him three days previously by a poultry-dealer named Ellen Neill, of the Faythe, Wexford, Ireland. The Faythe is a suburb where the wild-fowl-shooters reside; and as it was certain that the birds had not been frozen, or even sent over in ice, there seemed to be no reason to doubt that they had really been killed in that district. Of course I at once wrote for particulars; but failed to elicit any direct reply. I subsequently gave the necessary details to Sir Victor Brooke, who kindly took a great interest in the matter, and, on the occasion of my reading this paper, has put into my hand a letter just received, and I am thus enabled to quote in its proper place this most valuable corroborative evidence.

"Wexford, March 14th, 1872.

"I have succeeded in tracing the Geese referred to. They were shot by a boy on the lake of Tacumshane, on the south coast of this county, and were the only ones which appeared there; but there was a third one subsequently shot in Wexford Harbour. So far as I have been able to learn, no others like them have been seen here; but I shall try and find out more about this. They had been swimming about on the lake (or lough) for some days before they were shot; and the lake adjoins the sea, from which it is only separated by a narrow ridge of sand, and it would probably be one of the first places birds would make if coming from seaward. I am sorry for the delay in replying to your letters; but it was only to day I was able to do so, as Mrs. Neill is only a poultry-dealer, and not particular in inquiring where the birds she buys come from.

"Yours, &c.,

"(Signed) Sim Little."

The stomachs of these birds contained nothing but a little grit, some of which I have preserved. On dissection they proved to be male and female, and from their plumage are evidently birds of the year. The sternum of each, and the trachea of the female, have been carefully preserved, the trachea of the male having been shattered by shot.

The following is the description taken before the birds were

skinned:—General colour of the upper surface greyish brown; the feathers white at the base, then brownish grey with whitish edge; forehead and sides of face whitish; wing-coverts grey in centre of feather edged with white; quills black; shafts white, shading off into brown towards tips, the secondaries with a narrow whitish border; rump and tail-coverts pure white; tail white, with a tinge of grey round the shaft of the middle feathers; under surface of the body white, slightly tinged with grey on the neck; under wing-coverts and axillaries white; bill nearly black, with a reddish tinge, especially on the lower mandible; tarsi and feet lead-colour, running into yellowish red, especially on the webs close to the toes.

We supposed, at the time, that these were *Anser hyperboreus*, Pallas, of which the occurrence in Europe has already been recorded; but on comparing them with specimens in the British Museum, they appeared to be nearly as much too small for that species as they were too large for *A. rossii*, Baird. Besides the latter is still further distinguished by the caruncles at the base of the bill, which have induced Mr. D. G. Elliot to give it the new generic name of *Exanthemops*. Mr. Elliot having enjoyed the advantage of examining the type specimen of *Anser albatus*, Cassin, which he has figured in his 'Birds of North America,' vol. ii. p. 42, his suggestion that these birds might prove to be young of that species carried with it great weight; and subsequent careful and detailed examination and comparison with specimens kindly lent me by Professor Newton, out of the Hepburn Collection, Cambridge University Museum, have convinced me not only that these two birds are *A. albatus*, but that three of those from the Hepburn Collection also belong to that species, and not to *A. hyperboreus*.

In the original description given by Mr. John Cassin, 'Proc. Acad. Nat. Sc. Phil.' 1856, p. 41, he gives the habitat of *A. albatus* as "Western and Northern America, Oregon, rare on the Atlantic. A single specimen from Oregon is in the collection of the Exploring Expedition in the 'Vincennes' and 'Peacock;' and four specimens, which occurred in pairs, have come under my notice in the market in Philadelphia in the course of twenty years. These five specimens are all that I have seen of this species; and it is very probably of rare occurrence on the coast of the Atlantic. The four specimens alluded to, which are a pair of adults and a pair of young, are now in the collection of the Philadelphia Academy."

It may be remarked as, at least, a coincidence, that the two young referred to above are also *a pair*.

As the difference between *Anser hyperboreus* and *Anser albatus* is, after all, principally that of *size*, I have tabulated the more important measurements of the two species, heading the list with Cassin's dimensions of each, followed by those of the specimens I have examined in the order of age as indicated by the plumage. Cassin's measurements are avowedly taken from males; he states that the female in each species is a trifle smaller; and whenever the sexes have been ascertained, this is fully borne out in the present table.

	Wing.	Tarsus.	Bill, along culmen, from tip to frontal feather.	
	in.	in.	in.	
Anser hyperboreus ♂, Cassin	18½	3¼	2⅛	
„ „ ♀, coll. H. Saunders ..	17	3*	2⅛*	Adult.
„ „ coll. Hepburn.	17	3¼*	2⅜*	„
Anser albatus ♂, Cassin	15¾	3	2	„
„ „ No. 463, Hepburn coll.	15	2⅞	2	Prob. spring.
„ „ No. 1438, „	15½	2⅞	2	„
„ „ No. 1437, „	15⅜	2⅞	2⅛	„
„ „ ♂, coll. Sharpe and Dresser.	15½	2⅞	2⅛	November.
„ „ ♀, coll. H. Saunders	15	2⅞	2	„

These measurements have been taken by Mr. Sharpe and myself with the greatest exactness, at first independently, and afterwards by carefully remeasuring whenever there appeared the minutest discrepancy.

Since Cassin first considered that there was sufficient difference in these dimensions to warrant a specific distinction, evidence strongly comfirming his views has been received from Mr Bernard H. Ross, who, in his paper on the Fauna of the Mackenzie-River District (Nat. Hist. Rev. 1862, p. 286), writes as follows:—"There can be little doubt of the existence of three species of Snow-Geese (exclusive of the Blue Wavey of Hudson's Bay), as the Slave-Lake Indians have a different name for each kind. The first which arrives is the middle-sized species, which I believe to be the *A. albatus*; next comes the smallest sort, the *A. rossii*, and lastly the *A. hyperboreus*, which arrives when the trees are in leaf, and is called the Yellow Wavey by the Indians." It may be objected that savages and uneducated people generally (though the failing is not confined to that class) are great species-makers; to this I would reply that, in the present case, the Indians are clearly right about two out of the three species, and the odds are therefore two to one in favour of their being correct as to the third.

The very fact of these birds having visited the milder climate of the shore washed by the Gulf-stream is an additional evidence of its distinctness as a species. Cassin lays especial stress upon the fact of its habitat being confined to the extreme north-*western* portion of the American continent; and we know that on that coast the winter set in last year so early, and with such unexampled severity, that of the thirty or forty whalers which frequent Behring's Straits, only three managed to escape from the ice; while, on the other hand, I am not aware that the more central and eastern portions have experienced a winter of any unusual rigour.

* Colour red.

6. On *Hydropotes inermis* and its Cranial Characters, as compared with those of *Moschus moschiferus*. By Sir Victor Brooke, Bart., F.Z.S.

[Received March 14, 1872.]

Having received from Mr. Gerrard three perfect skulls of the rare ruminant *Hydropotes inermis*, lately described by Mr. Swinhoe, I have thought it worth while to lay before the Society a few observations on its dentition and cranial characters, supplementary to those afforded by the describer in the Society's 'Proceedings' for 1870, p. 89. In addition to my own specimens, which consist of an adult male and an immature male and female, I have had the advantage of examining the skull of a remarkably fine old male, presented a short time ago to the College of Surgeons by Dr. Hamilton, and noticed by him at the meeting of this Society on the 5th of December last*. I have also seen Mr. Swinhoe's type specimens. I fear, however, I must differ from Mr. Swinhoe in so far as he considers that this species evinces affinity in its cranial characters to the *Cervus pudu* of Chili. In the general form of skull, as well as in the details of cranial structure, *Cervus pudu* appears to me to differ considerably from *Hydropotes inermis*, and to exhibit close affinity to the simple horned Brocket-deer of South America, included in the subgenus *Coassus*. In this form the suborbital fossa is remarkably shallow—in one species, *Coassus rufus*, almost absent. To *Moschus* the affinity of *Hydropotes*, as far as general cranial characters are concerned, is more decided; there is the same remarkable narrowness and elongation of skull, the total suppression of horns, and vigorous development of canines in the males. But notwithstanding these more superficial resemblances, an examination of the base of the skull reveals distinctive characters, which I think fully warrant the generic rank Mr. Swinhoe has assigned to the species. The form and structures surrounding the auditory bulla differ widely in *Hydropotes* and *Moschus*; and the consideration of the important results arrived at by Professor Flower in his classification of the Carnivora in the 'Proceedings' of the Society for 1869, p. 4, along with the recollection of Mr. Turner's natural arrangement of the *Bovidæ* in the 'Proceedings' for 1850, p. 164, both of which sound classifications are founded on characters derived from this part of the cranium so widely removed from the modifying power of adaptation, induce me to attach the highest taxonomic value to such characters. In *Hydropotes* the auditory bulla is large and much inflated, having a deep depression on its external surface for the reception of the tympano-hyal; the external auditory meatus opens immediately into the bulla, there being no spout-like prolongation of the tympanic bone. In *Moschus* the auditory bulla is remarkably small, the petrous portion of the periotic being visible, when viewing the base of the skull, for nearly the entire length of

* See P. Z. S. 1871, p. 702.

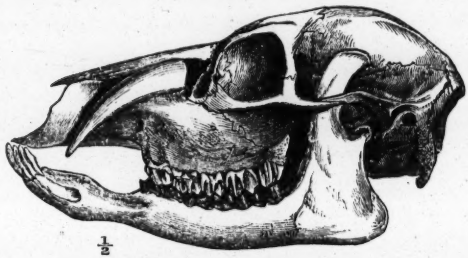
the bulla from before backwards. The tympanic is considerably prolonged to form the inferior floor of the external auditory meatus. Correlated with this great difference in the size of the auditory bulla, the basioccipital is much wider relatively in *Moschus* than in *Hydropotes*, being raised into a low median ridge, whereas in *Hydropotes* this bone is rather narrow and slightly grooved from the foramen magnum forwards. In *Hydropotes* the præmaxillæ are very much shorter and broader than in *Moschus*. The rami of the lower jaw in *Hydropotes*, from the dental foramen to the external incisor, are very much compressed from side to side, and raised into sharp laminated everted edges, in adult specimens a quarter of an inch in height. In *Moschus* there is no trace of this curious formation.

In dentition the most remarkable difference between *Hydropotes* and *Moschus* lies in the form and direction of the incisors. In form, those of *Hydropotes* resemble the ordinary ruminant type; in direction, their axes form an angle of about 45° with that of the rami. In *Moschus* the edges of the incisors run almost parallel, there being but little tendency to flattening and widening out, the series presenting unusual equality in size; their direction is but slightly removed from the plane of the lower jaw. Both in form and direction they bear a singular resemblance to the incisors of the Reindeer, and are possibly special adaptations in widely separate forms of *Cervidæ* to like functional purposes.

The molar series presents no striking difference between the two genera under consideration. In *Hydropotes* the teeth are, perhaps, somewhat wider from side to side, especially the premolars, than they are in *Moschus*; their formula would stand, P. $\frac{3}{3}$. M. $\frac{3}{3}$. as in other ruminants. The canines of *Hydropotes* are very powerful, apparently not reaching to so great a length as in *Moschus*, but exceeding them greatly in massiveness. As these teeth attain their maximum of development the pulp-cavity contracts, accompanied by the gradual protrusion of the root of the tooth. In the younger male (fig. 1, p. 524), which exhibits the three milk-molars along with the two anterior true molars, it will be perceived that the large open proximal end of the canine is situated as far up as the anteorbital vacuity. In an adult male (fig. 2) presenting the full series of permanent teeth, the canine has advanced the distance of about an inch downwards from the position observed in the younger animal, and the pulp-cavity is greatly contracted. In (fig. 3) that of the fine old male presented by Dr. Hamilton, the canine has protruded still further, and the pulp-cavity is entirely obliterated. This same process takes place in *Moschus* and in *Cervulus*—in the former more slowly, in the latter more rapidly than in *Hydropotes*.

Conclusion.—So far as the materials at my command have enabled me to form an opinion as to the position *Hydropotes inermis* would occupy in a systematic arrangement of the Cervidæ, it appears to present sufficiently aberrant characters to separate it from any of the known forms. It must, however, be left for further knowledge of the species to determine the essential importance of these cha-

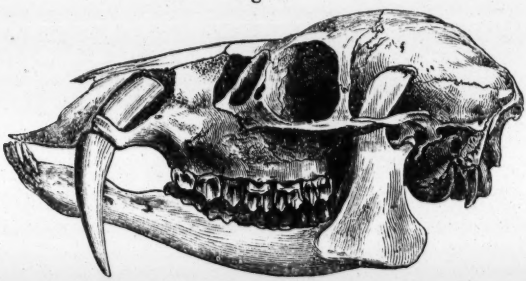
Fig. 1.



½

Skull of *Hydropotes inermis*, ♂, jr.

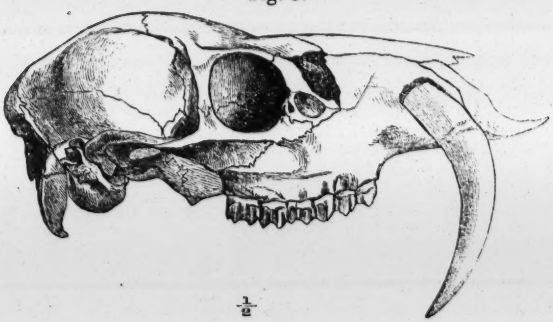
Fig. 2.



½

Skull of *Hydropotes inermis*, ♂, ad.

Fig. 3.



½

Skull of *Hydropotes affinis*, ♂, max. ad.

racters. For the present, I should be inclined to leave it in a group by itself, placing it in a plan of genealogical descent expressed by the top of a tree (such as that so frequently used by M. Milne-Edwards and Professor Flower) in a circle not far removed from the great *Rusa* group of Asia, to which, notwithstanding the absence of horns, many of the cranial characters lead me to think *Hydropotes* most nearly allied.

April 16, 1872.

Dr. E. Hamilton, V.P., in the Chair.

A letter was read from Dr. R. Schomburgk, Director of the Botanic Garden, Adelaide, South Australia, C.M.Z.S., giving particulars of an instance in which a Monkey (*Macacus radiatus*) belonging to the zoological department of that Garden appeared to have exhibited reasoning powers.

The following papers were read:—

1. On the Mechanism of the Gizzard in Birds.

By A. H. Garrod, B.A., F.Z.S., Prosector to the Society.

[Received March 19, 1872.]

Notwithstanding the fact that the external form and general structure of the gizzard is known to almost every one, very little seems to have been made out as to the means by which this organ is enabled to crush and render available for nutrition the hard grains taken as food.

By most writers, the gizzard is supposed to act as a grinding-mill, moving from side to side, assisted in its work by sharp-pointed stones which its owner swallows for the purpose. This was evidently the opinion of Hunter, though he seemed scarcely satisfied on the point when he found that there was no perceptible lateral movement of the muscular masses during digestion.

Harvey gave a very good description of the action of the gizzard, as far as he knew it, in his description of the abdominal viscera of the common fowl ('On Generation,' Exercise vii.); and Hunter is the only physiologist who seems to have worked at the subject since that time.

The structure of the gizzard as a specialized organ is best seen in the Anserine birds; and that of the Goose will be now described.

Externally it is circular when looked at from in front, oval from the side, and fusiform from above or below. The œsophagus enters it as a large infundibuliform tube, with the broader end downwards

at its highest point; and the duodenum is continued out of it behind and above.

The organ may be shown to consist of two lateral masses of muscle, with an oblong cavity between them, which opens above and below into two sacs, with muscular walls of nearly uniform thickness.

The anterior superficial circular view presents the appearance of a central tendinous area, from which four lines radiate, nearly at right angles to one another, in an X-like manner. The upper and lower median areas between the corresponding limbs of the X are muscular and rounded at the margin, with the fibres directed to the central tendon. The lateral spaces are covered with glistening tendon, which at the edges shades into muscular fibres, not in this case curved, but straight and consequently squared off.

The superior and inferior median portions are parts of the walls of the corresponding cavities already mentioned; and the œsophagus enters the former at its inner angle, close to its junction with the right lateral mass; the duodenum being behind.

The lateral masses, with their tendinous coverings, are the muscular portions; and the cavity between them is just behind the central tendon.

The epithelial lining of the whole organ is very dense, and is continuous through the different cavities, terminating abruptly at the entrances to the œsophagus and the duodenum. Very shortly after the death of the bird it can be stripped off entire*. It is particularly dense where it covers the two lateral muscles, and generally forms a callous oval pad over each, which has to receive most of the force of the muscular walls as they act on the stones and food.

The central tendons, one in front and the other behind, are very strong; and so are the fibres which radiate outwards from them; they are almost entirely connected with the lateral muscles.

The lateral muscular masses have their fibres all tending forwards and backwards, each being inserted into both the front and back tendinous expansion, the central being nearly straight and the lateral ones being curved slightly outwards in the middle of their course.

The superior and inferior sacs are surrounded by muscular bands which bow over from front to back, being inserted into those parts of the margin of the central tendon to which they are opposite. By their contraction they reduce the size of the sacs and force any thing they contain between the lateral muscles, a considerable fold of the gizzard-lining, which acts as a kind of valve, preventing any stones entering the duodenum.

The action of the lateral muscles can be best understood by observing a horizontal section made through the middle of the gizzard.

The section is fusiform and exhibits a central oblong cavity, short from side to side, bounded before and behind by the central tendons, and laterally by the triangular muscular masses.

The accompanying figure and the above description show that in

* This coat is considered by recent German authorities to be a secretion from the deep glands, not an epithelium.

the gizzard there is no mechanism which could in any way produce any lateral movement of the one mass of muscles on the other; and it is difficult to conceive any epithelium, however horny and dense, that could resist the tearing-strain which would necessarily be associated with such movement, in addition to which, several gizzards that have passed through my hands have been so loaded with fat or adherent to the abdominal walls, that any lateral movement must have been impossible in them.

Fig. 1.

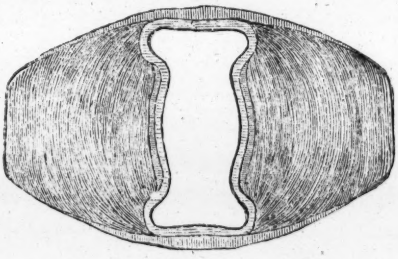


Fig. 2.

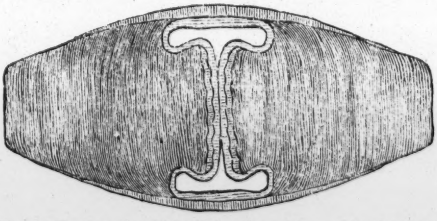


Fig. 1. Horizontal section of the gizzard in a state of relaxation.
2. The same in a fully contracted state.

The following explanation of the action of the gizzard as a simple crushing-organ seems to me much more in accordance with the known principles of animal mechanics.

As is well known, muscular tissue, when it contracts, does not alter in volume, but gains in breadth what it loses in length during its action. Consequently when a large mass of short muscular fibres contracts it must alter its shape considerably, increasing greatly in breadth.

This fact being borne in mind, the action of the gizzard is easily explained.

The two enormous lateral muscles, with their fibres tending forwards and backwards, when relaxed, have a large cavity between

them, into which the seeds and stones are thrust by the simultaneous contraction of the superior and inferior muscular bags. Directly these have become fully contracted, the lateral muscles act; and by approximating the anterior and posterior tendons they become greatly expanded laterally. But this expansion can take place in one direction only—namely, towards the gizzard-cavity; for the anterior and posterior tendons being situated obliquely with regard to one another, and the contraction taking place through the whole mass, expansion can only occur towards the base of the triangle. The motion in this direction is furthered by the arrangement of some of the muscular fibres, as can be seen on close inspection of the section of the relaxed gizzard; for the dense horny pads above referred to are cupped on their attached surfaces, and the fibres run from one margin of this cup to the other, in an arched manner, as seen in the section. Those fibres just above the cup are arched also in the same way, and the epithelial margins of the cup are more yielding than elsewhere. Consequently, when the contraction occurs, the fibres straightening reduce the antero-posterior diameter of the cup and make the pad more convex towards the intermediate cavity, and push each towards its fellow, this action, combined with that of the other more marginal fibres, producing a most powerful compression of the contents.

The great force exercised laterally by the contraction of a muscle can be well shown by tying a piece of tape round the middle of the arm proper, and then causing the biceps to contract forcibly, whereby the tape is broken.

As remarked by most writers on the subject, every intermediate condition of muscularity of stomach may be found in birds, from the simple non-tendinous one of the Raptores and others to the most muscular of the Anserine birds. The degree of muscularity depends on the nature of the food which the bird obtains, as shown by Hunter's experiment, in which he, by giving animal food to a Duck (I believe), caused a great diminution in the muscularity of its gizzard.

The state of the bird as to health also influences the development of the muscular fibres, the heart and gizzard being very similarly affected by impaired nutrition.

In the Gallinaceous and Passerine birds there is seldom a callous pad formed over the lateral muscles, the epithelium being generally plicated at right angles to the direction of the muscular fibres; and in them the organ seems to be a more simple squeezing-organ, though when rigor mortis occurs in a contracted gizzard it is seen that the muscular masses are convex on their opposed faces.

From these remarks and what has been previously observed on the subject, the following summary statement may be made:—

The gizzard is an organ which crushes, and so renders assimilable the harder portions of the food of birds. This food, having been previously macerated in the proventriculus or crop, is thrust between the lateral muscles (where it gets mixed with the small sharp stones it meets there) by the contraction of the superior and inferior

gizzard-sacs—upon which these lateral muscles contract simultaneously; and their arrangement is such that all the force of their contraction is converted into a compressing force at right angles to their direction. This force, by tending forcibly to obliterate their included cavity, comminutes the more yielding of their contents and squeezes from between them the resulting chyme, which finds no difficulty in entering the small orifice to the duodenum*.

2. On a supposed new Monkey from the Sunderbunds to the East of Calcutta. By JOHN ANDERSON, M.D.

[Received January 15, 1872.]

The natives of the district indicated in the title of this paper assert that two Monkeys occur in it, viz. the red-faced *Inuus rhesus* and another Monkey, which they state has no red about the face or on the hinder quarters. Acting on this information, I sent a collector to procure for me specimens of the two forms; and he returned with a number of undoubted examples of *I. rhesus*, and with two fresh skins which appear to me to be very different from any adult of *I. rhesus* that I have examined. The specimens in question were shot about 50 miles to the east of Calcutta; but as they only reached me as skins I can only give the measurements of these, and of the bones of the limbs and the characters of the skull. The longest skin measures from the snout to the root of the tail 22″. The tail is 12½ inches long; the front limb 16″ 6‴ and the hind limb 18″ 9‴ in length; the hand is 4″ 6‴ and the foot 6″ 9‴ long. The bones of the limbs measure as follows:—humerus 6″ 3‴, radius 5″ 10‴, ulna 6″ 9‴, femur 6″ 10‴, fibula 5 15/16″, and the tibia 6″ 3‴. The fur is thick and rather woolly, and of a coarser texture than in *I. rhesus*, and presents no trace of annulation beyond the dark brown tips to the hair. As in that species, it is longest on the fore part of the body, especially on the interscapular region and shoulders and over the humerus. It is uniform brown above and on the front of the thighs, and pale on the outside of the limbs, but slightly darker on the back of the hands and feet. The under surface and inside of the limbs are of a dirty yellowish white; the tail is brown above, con-

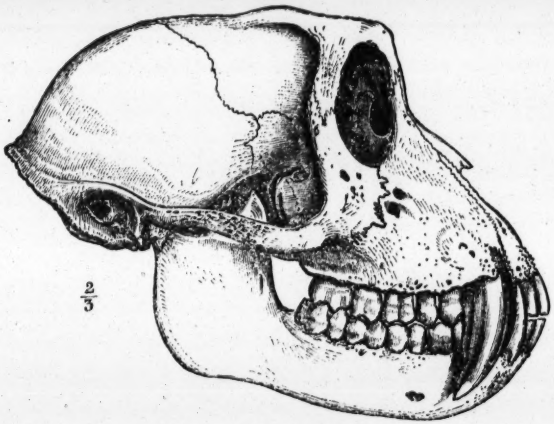
* Since writing the above I find that there is a peculiarity in the gizzard-pads in the Swan and Goose, which causes a slight up and down movement of the lateral muscular masses when in action. The lower end of one pad and the upper end of the other are much more strongly developed and are thicker than the rest: this causes them to present a surface of contact one with the other, which is somewhat oblique with regard to the axis of the lateral muscles. Consequently, when these muscles come into play, the oblique surfaces tending to come into contact, the material to be crushed intervening, they, being opposed inclined planes, slide slightly on one another, the one mass rising while the other descends. During the diastole of the gizzard it resumes its former relations, and a reverse sliding occurs.

colorous with the back, and paler on the under surface. The hair on the top of the head is directed backwards. There is a superciliary band of black and dark brown hairs extending to the external orbital angle of the malar, where it meets with another similar band that reaches to the ear, or nearly so. The hairs of the latter band on one side in the skin form a tuft below and posterior to the external angle of the eye; and another occurs behind the fronto-malar suture. The hair on the side of the head behind the angle of the mouth is directed forwards, and is concolorous with the inside of the limbs. The ears are well clad; and there is a tuft of dark brown, almost blackish hairs at their upper margin. The maxillary region is sparsely covered with short hairs; and the margins of the lips are thinly clad with long black hairs.

As all my efforts to obtain a living example of this Monkey have proved fruitless, I am unable to say any thing regarding the colour of the skin of the face beyond what I have already stated on the testimony of natives. The callosities are more or less oval, and measure 1″ 9‴ in extreme length and 1″ 1‴ in their greatest breadth; all the parts about them, and the back of the thighs below them, are thickly clad with brown hair and not seminude as in *I. rhesus*. The thumb is well developed; and the fingers and toes, when stretched in the dried skin, do not exhibit the interdigital membrane extending beyond the middle of the first phalanx.

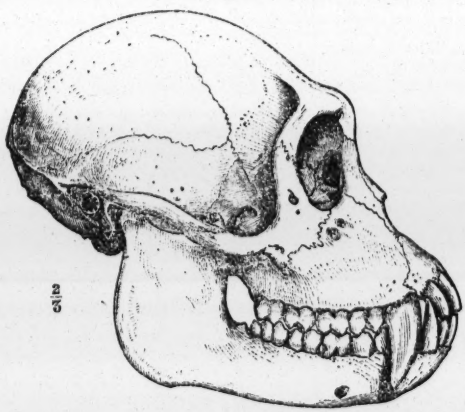
The distinguishing features of the shull, as compared with *I. rhesus*, are these:—It is larger than any skull of *I. rhesus* that has come under my observation, and is considerably more elongated, as is best seen when the two skulls are viewed from the under surface. In that position the facial portion is observed to be proportionally more strongly developed, larger and broader than in *I. rhesus*, and to equal nearly one half of the entire length of the skull, while in the latter species the facial portion is hardly perceptibly more than a third of the extreme dimensions of the skull. These proportions are founded on lines drawn vertically to the extremity of the præmaxilla and frontal, and another to the hinder margin of the skull. The greater size and more elongated character of the muzzle of the Sunderbunds Monkey is also well apparent in front and profile views of the skull. In the former aspect a striking feature is the broad and slightly concave preorbital surface, due to the outward convexity of the maxillæ produced by the enormously developed canines. In profile (see figs. 1 & 2, p. 531) the facial portion (maxillary region) is seen to be thrown more forwards than in *I. rhesus*, owing to the forward projection of the maxillary; and the infraorbital section of the malar is of great vertical extent, and directed outwards, forwards, and downwards; while in an adult skull of undoubted *I. rhesus* before me it is relatively much less expanded, and courses downwards and backwards. The infraorbital foramina are more remote from the margin of the orbit than in the last species. Another distinction between the two skulls is the much greater forward sweep and less curved character of the nasals in the Sunderbund Monkey, which also confers on the face a greater forward extension and expansion of the muzzle than in *I.*

Fig. 1.



Skull of *Inuus* from the Sunderbunds.

Fig. 2.



Skull of *Inuus rhesus*, adult.

rhesus, in which the nasals are very short. In the former, also, the orbits look more upwards than in the latter, and they are rounded expansions quite as high as broad; while in the skull of

I. rhesus the superciliary ridge depends over them, and they are broader than high. In *I. rhesus* the palate partakes more or less of an elongated oval, whilst in the Sunderbunds Monkey it is much more oblong; in the latter it may also be pointed out that the posterior nares are narrower and more elongated than in the former, in which they are broader and more triangular than oval. The nasal orifice of the Sunderbunds skull is proportionally much more capacious than in *I. rhesus*, longer and directed more upwards. Its frontal shelves at once backwards and downwards from the superciliary margin, behind which there is a very faint convexity succeeded by a depression on either side of the frontal crest in the position of the same suture. The crest begins in the middle of the upper surface of the frontal, and is continued backwards as a sagittal crest. The temporal ridges proceed from the posterior sharp malar angle of the frontal, and abruptly arch inwards to join the anterior extremity of the median frontal ridge, defining a triangular surface, the base of which is formed by the superciliary margin of the frontal. In *I. rhesus* the frontal is well arched, and there is a considerable depression behind the superciliary crest, the temporal ridges not uniting in the median line, but being continued widely apart and passing directly backward parallel to each other as far as the lambdoidal suture. There is no frontal or sagittal ridge or crest in any adult *I. rhesus* I have examined. The parietal region in the Sunderbund Monkey wants the full rounded character that that area of the skull has in *I. rhesus*; and the occipital surface in the latter is much more convex than in the former, in which it is nearly quite flat, and directed much more downwards than backwards, while it looks backwards and only slightly downwards in *I. rhesus*. The mastoid region of the Sunderbunds skull is much more developed than in *I. rhesus*.

When the two skulls are viewed from the under surface, the most striking difference between them in that aspect is the contracted zygomatic arch of the Sunderbunds Monkey compared with the full and much arched zygomata of *I. rhesus*, which confers on the skull a shorter and more rounded character which does not belong to the former.

I have examined numerous living adult males of *I. rhesus*, but I never yet observed a specimen with the hair devoid of annulations; and in all, the thighs below the callosities were seminude,—characters which are the very opposite of those that prevail in the supposed new form. As I have not seen the living animal, and only know of it through two skins, I hesitate to do more than to state that it appears probable that two Monkeys occur in the Sunderbunds, and that they have hitherto been both included under *I. rhesus**.

The accompanying table contains the measurements of the skull

* The Monkey recently purchased of Mr. Jamrach, and named *I. rhesosimilis* in my report (*antea*, p. 495), is, I have little doubt, a young example of the present species. Mr. Blyth suggests it may be the *Macacus assamensis*, M'Clell. (P. Z. S. 1839, p. 148), which is very probable.—P. L. S.

of *I. rhesus*, which, on the authority of Mr. Blyth, is that of an adult, and the corresponding dimensions of the skull of the Sunderbunds Monkey:—

Measurements of skull of I. rhesus (No. 1 *) *and Monkey from the Sunderbunds* (No. 2).

	No. 1.		No. 2.	
	in.	lin.	in.	lin.
Extreme length of skull	4	7	5	3
Anterior margin of foramen magnum to anterior margin of premaxillary	3	2	3	7
Anterior margin of foramen magnum to palatal border (posterior)	1	4½	1	3½
Posterior border of palate to tip of intermaxillaries	1	10	2	4
Extreme breadth across zygomatic arches	3	6	3	4
Breadth over internal auditory foramen above root of zygomata	2	6	2	6
Breadth between temporal fossæ behind orbits, narrowest portion of skull	1	9½	1	9
Anterior margin of external auditory foramen to lower infraorbital foramen	2	1	2	4½
Lower infraorbital foramen to tip of premaxillary	1	5½	1	8
Posterior extremity of nasals to anterior extremity of premaxillaries	1	10	2	7
Length of external aperture of nostrils	0	9	1	1
Breadth of external aperture of nostrils	0	6	0	8
Breadth across malars (temporal curve)	2	8½	2	10½
Distance between anterior tips of maxillaries	0	11½	1	2
Breadth across orbits, internal margin	2	2	2	3½
Extreme height of orbits	0	10½	1	0
Greatest breadth of palate	0	11½	1	0
Length of posterior nares	0	6	0	7½
Length of alveolar surface of upper jaw	1	10	2	2½
Distance between canines internally at base	0	7½	0	10
Distance between last molars internally	0	10	0	9½
Depth from posterior border of palate to upper margin of superciliary ridge	1	9	2	2
Depth through anterior margin of foramen magnum	2	4	2	1
Condyle of lower jaw to tip of symphysis	3	9	3	9½
Condyle to coronoid process	....		0	8½
Depth through coronoid process	....		1	10
Depth through condyle	....		1	6
Depth of jaw behind first premolar	....		0	11½
Depth of jaw behind last molar	....		0	10½
Breadth of ascending ramus	....		1	3½

* Blyth states that this is the skull of a very large male; and as it is the largest in the Museum, I have selected it for comparison with the Sunderbunds skull, although it unfortunately wants the lower jaw.—J. A.

3. On the Birds of the Rio Negro of Patagonia. By W. H. Hudson, C.M.Z.S. With Notes by P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received March 12, 1872.]

(Plate XXXI.)

I wrote a few days ago to inform Mr. Sclater that I had returned from Patagonia, and had determined to send to him all the specimens, or at least duplicates of all the species collected, as well as my notes on them. I now forward them; and as I cannot here learn the names of some of the species of which I am most anxious to speak, I have numbered these, so that it will be necessary to refer to the specimens themselves to ascertain their scientific names.

My observations have been confined to the valley of the Rio Negro and to the adjacent high grounds. I advanced altogether not much over a hundred miles from the sea.

I met with one hundred and twenty-six species of birds altogether on the Rio Negro; but of these, ninety-three are also found in the Buenos-Ayrean pampas. Most of the species common to Buenos Ayres and Patagonia are resident land birds in the latter locality. Seven or eight of them are summer visitors from the north, and as many more are Patagonian species that visit Buenos Ayres in winter. I therefore met with only thirty-three species peculiar to Patagonia; and as some of these are very rarely seen, I did not succeed in obtaining them all. This is certainly a very insignificant number; but in a country with an excessively dry climate, the watercourses few and widely separated, an arid sandy soil, and scanty, dwarfish vegetation, it is impossible that there should be many species of birds. Still, had I been enabled to advance one or two hundred miles further, I am confident that this collection would have exhibited a far greater variety, as the country becomes much more thickly wooded in the interior. I did not succeed in obtaining specimens of the *Avestruz petise* (*Rhea darwini*). It is called by the Indians "Molu Chinque," meaning "Dwarf Chinque," the name of the common species being Chinque. They are found over the whole country, from the Rio Negro to the Straits of Magellan, and are also met with, but rarely, north of the river. They were formerly exceedingly numerous along the Rio Negro; but a few years ago their feathers rose to an exorbitant price. Guachos and Indians found that hunting the Ostrich was their most lucrative employment; and consequently these noble birds were pursued unceasingly, and slaughtered in such numbers that they have been nearly exterminated wherever the nature of the country admits of their being chased. I was so anxious to obtain specimens of this bird that I engaged ten or twelve Indians, by offering a liberal reward, to hunt for me; they went out several times, but failed to capture a single adult bird.



J. Smit. lith.

CNIPOLEGUS HUDSONI.

ARCHIVES
2000 73
NATIONALES

A few facts I have been able to gather in reference to them may not prove uninteresting, as the *R. darwini* is but imperfectly known. When hunted it frequently attempts to elude the sight by suddenly squatting down amongst the bushes; and when lying close amid the grey-leaved bushes that cover the country it frequents, it very easily escapes the sight. When hotly pursued, it possesses the same remarkable habit as the *R. americana* of raising the wings alternately and holding them erect; it also manifests the same facility for suddenly doubling, in order to avoid its pursuers. It runs more swiftly than the common species, but is also more quickly exhausted. When running, the *R. americana* carries the neck erect or slightly sloping forward; the *R. darwini* carries it stretched forward almost horizontally, making it appear smaller than it is. From this habit it is said to derive the vernacular name of "Dwarf Ostrich." They go in flocks of from three or four to thirty or more individuals. I have not been able to learn if the males fight together as do those of the *R. americana*, or if they possess, like that species, a call-note. The strange trumpeting cry of the *R. americana* is often heard after they have been hunted and scattered in all directions; it is an indescribable sound, and resembles somewhat the hollow heavy sigh with which a bull often ends his bellowing, and appears to fill the air, so that it is impossible to tell from which quarter it proceeds. The soft leisurely whistling notes are the same in both species. The *R. darwini* begins to lay at the end of July—that is, a month sooner than the *R. americana*; in all the breeding-habits of the two species there is a wonderful similarity.

A number of females lay in one nest, the nest being merely a slight depression lined with a little dry rubbish; as many as fifty eggs are sometimes found in one nest. But the *R. darwini*, as well as the common species, lays many "*huacho*," or stray eggs, at a distance from the nest. I inspected a number of eggs brought in by a party of hunters, and was surprised at the great differences amongst them in size, form, and colour. The average size of the eggs was the same as those of the common species; in shape they were more or less oval or elliptical, scarcely two being found precisely alike. When newly laid, the eggs are of a deep rich green, and the shell possesses a fine polish. They very soon fade, however; and first the side exposed to the sun assumes a dull pale mottled green; this colour again changes to a yellowish, and again to a pale stone-blue, becoming at last almost white. The comparative age of each egg in the nest may be told by the colour of its shell.

When the females have finished laying, the male sits on and hatches the young. The young are hatched with the legs feathered to the toes; these feathers are not shed from the legs, but are gradually worn off as the bird grows old by continual friction against the stiff shrubs amid which they live. In adults usually a few scattered feathers remain, often only the worn-down stumps of feathers; but I have been told by hunters that the old birds are sometimes caught with the legs entirely feathered, and that these birds frequent plains where there was but little scrub.

The plumage of the young birds is of a dusky grey, without any white or black feathers or spots. When a year old they moult, and acquire the spotted plumage of the adults, but do not attain the full size till the third year.

1. The Falcon*.

This bird is met with in the thorny thickets on the high-terraced tablelands on either side of the Rio Negro. It is a solitary bird, and almost invariably found perched on the summit of one of the little bushes or trees; and amidst the uniform dull grey hue of the vegetation, its broad, pure white bosom renders it conspicuous at a great distance. It is a handsome bird, with an easy graceful flight, and when looking out for prey sails far higher than Hawks usually do. It preys much on the *Tuco-tuco* (*i. e. Ctenomys brasiliensis*), and seems to find abundance of food; for all the specimens I shot were exceedingly fat. It builds its nest in the centre of a large bush, and lays three white eggs.

While looking out for specimens of this Hawk I met with another species so remarkable in its structure and habits that I cannot refrain from giving a short notice of it, though, to my intense disappointment, I did not succeed in getting any specimens of it. It is apparently smaller than *Falco sparverius*; the upper plumage grey, the wings and under plumage white; the tail is long; the wings very blunt, and so short that when on the wing the bird rushes through the air with great violence. They are seen in pairs, sitting on the top of a bush, and at long intervals through the day suddenly burst into a loud excited chorus of notes, which resembles more the language of a Passerine bird than of a Hawk. Whenever I approached one, it would utter a loud, long cry of alarm, and go on repeating it till, before I was within shot, it would fly off, and take up its position on a distant tree. I saw about a dozen individuals, and followed them about several days, but in vain.

There is in the woods, on the margin of the Plata, a diminutive Hawk very rarely seen, and called by the natives *Rey de los Pajaros*, closely allied in size and form to the Patagonian bird, but differing in colour and possessing a far easier flight.

There are four Eagles found on the Rio Negro, but all doubtless well known. I send you two Owls†; the Burrowing Owl is also found along the Rio Negro. There are two Vultures, the Black and the Red-headed Vulture. The Condor is also met with occasionally

* The diurnal Accipitres of which specimens are sent by Mr. Hudson are of nine species, namely:—

1. *Cathartes atratus* (Bartr.).
2. *Polyborus tharus* (Mol.).
3. *Milvago chimango* (Vieill.).
4. *Hypotriorchis femoralis* (Temm.).
5. *Tinnunculus sparverius* (Linn.).
6. *Harpyhaliaëtus coronatus* (Vieill.).
7. *Geranoaëtus melanoleucus* (Vieill.).
8. *Buteo erythronotus* (King).
9. *Circus cinereus* (Vieill.).

Unfortunately none of these are numbered 1; so that I am not able to say to which, if any, of these species Mr. Hudson refers as "The Falcon."—P. L. S.

† *Bubo virginianus* (Gm.) and *Glaucidium nanum*.—P. L. S.

on the Atlantic coast; I saw but one individual, and was surprised to find him proof against several charges of shot.

2. CHINGOLO GRANDE*.

This bird is the only representative of the Tanagers I have met with here, and differs from its gaudy congeners of the tropics in its plainer dress alone. Side by side with them it would truly be a sober bird; but seen amidst the dull-plumaged tribes that people the grey thickets of Patagonia, the rufous throat and bosom of the male give it almost a gay appearance. In its habits it very closely resembles the *Tanagra striata*: like that bird it builds a round and shallow nest in a close bush, and lays four eggs. It goes singly or in small flocks, sits on the top of a bush, and hides when approached, feeds on fruit and seeds; the flight is a series of sudden, short undulations, the wings producing a loud humming sound. The notes of the male are remarkable, and resemble, when the bird sings or utters its alarm on the nest being approached, the feeble bleating of a kid or lamb. This peculiar intonation is also possessed by the *Tanagra striata* in its song. This bird is quite common in the thickets bordering on the river.

3. [PHRYGILUS FRUTICETI, Kittl.; Scl. Cat. A. B. p. 111.—P. L. S.]

This is a pretty and elegant bird, though possessing no bright colours; they go in pairs in the warm season, but in the winter unite in flocks often of two or three hundred individuals, and have a graceful undulating flight. On being approached they utter a series of low ticking notes, and occasionally a long squealing cry. The male has also a very agreeable song, which continues all the year. In pleasant weather the song is heard at all hours, on cold and cloudy days only at sunset. The bird usually soars from his perch, and utters his song while gliding down with wings depressed and tail outspread. When I first heard it, I was startled with its wonderful resemblance to the song of the Correndera Pipit (*Anthus correndera*); it is, however, much shorter and more powerful. This species is quite common in the thickets along the Rio Negro, in the neighbourhood of Carmen, but following up the river appears to become much rarer.

4. [DIUCA MINOR, Bp. Consp. i. p. 476.—P. L. S.]

This pretty little bird is exceedingly lively in its motions, social and quarrelsome in habits, and in winter often goes in flocks of several hundred individuals. The flock is usually widely scattered when on the ground and bushes; and when flying the birds incessantly pursue each other through the air, uttering all the time a soft chirp. The song of the male is the sweetest I have heard in Patagonia, with two exceptions—that of the *Cardinal amarillo* (*Gubernatrix cristatella*) and of the *Calandria blanca* (*Mimus triurus*), one who knows by heart "the songs of all the winged

* *Phytotoma rutila*, Vieill.—P. L. S.

choristers." In summer, when these Finches live in pairs thinly scattered over the country, the song of the male is the first indication of the approach of day. When the profound stillness of midnight yet reigns and the thick darkness that precedes the dawn envelopes earth, suddenly the noise of this little bird is heard wonderfully sweet and clear. In this quiet hour the song may be heard at a great distance, and is composed of half a dozen notes, repeated at short intervals till the day has fully dawned. But in winter, when they live in companies, their great singing-time is in the evening, when the flock has gathered in some large thick-foliaged bush, which they have chosen for a winter roosting-place. This winter-evening song is very different from that heard in summer, the notes appearing sharper, and uttered in a wild and rapid manner. A little after sunset they burst into a concert, which lasts several minutes, sinking and growing louder by turns, and in which it is quite impossible to distinguish the song of any individual. After a few minutes of silence, the singing is suddenly renewed, and again almost as suddenly ended. For an hour after sunset this fitful and impetuous singing is continued. Close by a house I lived in several months were three large *chañar* bushes, where a multitude of these Finches roosted every night; and they never missed singing a night, however cloudy, or cold, or rainy the weather was. So fond did they seem of this charming habit, that when I would approach the bushes, or stand beneath them, the alarm caused by my presence would interrupt the performance but a few moments; for suddenly they would burst almost simultaneously into singing, the birds all the time pursuing each other through the bushes often within a foot of my head.

The last three species I have described are the only hard-billed birds I found in Patagonia with which I was not before acquainted.

5. [MIMUS PATACHONICUS, Lafr. et D'Orb.—P. L. S.]

The Patagonian Calandria closely resembles the Buenos-Ayrean *Mimus calandria*, but is smaller, the plumage deeper grey, the eye is also a darker green. It is a very common bird, lives in pairs, and feeds on insects and berries. In its nidification it is like the *M. calandria*, the nest being composed of thorns and sticks, and lined with soft dry grass and cow-hair, and placed in the centre of a thorny bush; the eggs oval, four in number, and very thickly covered with flesh-coloured spots. When a person approaches the nest, the parent birds manifest their anxiety by perching and hopping on the twigs within a yard or two of his head, but without uttering any sound; the *M. calandria*, when alarmed, utters incessantly a loud harsh angry cry. Neither of these species will live in confinement.

The vocal performance of the Patagonian bird is characterized by the same apparently infinite variety as is that of the Buenos-Ayrean bird. It would scarcely be possible for me to give an adequate idea of its powers in a description; but I have among my notes some account of the song of *M. calandria*, which I will send at

some future time, and for the present satisfy myself by mentioning a few points in which the bird I am describing differs from the *M. calandria*. The singing of the Patagonian species is perhaps inferior, his voice being less powerful than that of the other species; his mellow or clear notes are often mingled with thrill ones resembling the songs or cries of various tenuirostral birds. While incapable of notes so loud or harsh as those of the Buenos-Ayres bird, or of changes so wild and sudden, he possesses even a greater variety of sweet notes: day after day, for months, I heard them singing, and I never once listened to them for any length of time without hearing some note or notes that I had never heard before. I have often observed that when a bird, while singing, emits a few of these *new* notes, he seems surprised and delighted with them; for after a silent pause he repeats them again and again a vast number of times, as if to impress them on his memory. When he once more resumes his varied singing, for hours, and sometimes for days, the expression he has discovered is still a favourite, and recurs with the greatest frequency. Many individuals seem to possess a peculiar style of singing; and they seem more or less able to borrow or imitate each other's notes: sometimes all the birds frequenting a thicket will be heard constantly repeating, for many days, a few particular notes as if they possessed no other song, while in other localities these notes will not be heard at all. The bird sits on the summit of a bush when singing; and its music is heard in all seasons, and in all weathers, from dawn till after dark; but he usually sings in a leisurely unexcited manner, remaining silent a long interval after every five or six or dozen notes, and apparently listening to his brother performers. These snatches of melody often seem like a prelude or promise of something better coming; there is in them such exquisite sweetness, such variety, that the hearer is ever expecting a fuller measure; and still the bird opens its bill to delight and disappoint him, as if not yet ready to begin.

6. [Mimus triurus, Vieill.; Scl. Cat. A. B. p. 9.—P. L. S.*]

I send you one specimen of the beautiful *Calandria blanca*. I do not know if any examples of this bird have ever been examined by naturalists. It is by no means numerous in Patagonia; certainly nothing was known of its song; but the pleasure I felt on making the discovery of its vocal powers it would be idle for me to attempt to portray. I noticed in the woods of *chañar*, along the Rio Negro, a few individuals of this species in the month of February; they did not sing then, but sometimes uttered a harsh note like that of the *Mimus calandria*. Had it not been for this note I should have thought the bird to be (seeing it only at a distance) a species of *Tænioptera*, from its black and white plumage, wild disposition, its

* I cannot distinguish the single specimen of this bird sent by Mr. Hudson from *Mimus triurus*, met with by Azara in Paraguay, by Bridges near Mendoza, and by D'Orbigny in Chiquitos, Bolivia. It is rather larger than my skin (collected by Bridges), and the black on the wings and tail is deeper; but I cannot regard it as distinct.—P. L. S.

rapid, high, and graceful flight. It disappeared in March without my having obtained specimens or heard it sing; for the native residents in Patagonia, many of whom were well acquainted with the bird, had told me that it was a very fine singer. In October, a few days before leaving the Rio Negro, I was one morning walking through the thick woods of *chañar*, when my attention was suddenly arrested by the song of a bird issuing from a bush close by, a song to which I listened with astonishment and delight, so totally different, so vastly superior to the songs of all other birds, whether native or foreign, to which I had ever listened. Notes surpassing in melody, power, and variety those of both the Patagonian and Buenos-Ayrean *Mimi* were rapidly poured forth in an unbroken stream, till I marvelled that the throat of any bird could sustain so powerful a song for so long a time. No sooner had this flow of unfamiliar music ceased, than I heard issuing from the same spot, the shrill, confused, and impetuous song of a small Patagonian Fly-cather, the No. 11*; this was succeeded by the delightful matin song of the small Grey Finch, No. 4†.

After this I heard the trilling song of the Red Bird (*Pyrocephalus rubineus*), with its silvery bell-like sound; then followed the leisurely uttered, mellow, delicious strain of the Yellow Cardinal (*Gubernatrix cristatella*). These songs followed rapidly (for no sooner did one end than the other began), and were all repeated with miraculous fidelity. At first I imagined that all these birds that had been imitated had actually been singing near me; but when the sweet vocalist resumed his own matchless song again, and I discovered that all the strains that I had heard had issued from a single throat, how much was my wonder and admiration for the delightful performer increased! I soon advanced near enough to catch sight of the singer, and found it to be the *Calandria blanca*. I found the pleasure of listening to him enhanced if he was at the same time seen: so carried away with rapture at his own melody seems the bird, so many and so beautiful are the gestures and motions with which he accompanies the performance. He would incessantly pass from bush to bush, sometimes soar above the thicket for a hundred yards, with a flight as slow as that of a Heron, and at times rise with a swift, wild flight, then slowly circle down and sit on the summit of a bush, with the broad wings and tail spread out, an object beautiful to see. What a pity it is that this bird should frequent only a desert country, where so very few can hear it. I cannot help saying that I consider it the finest singer in America, though such an opinion may be thought extravagant; but it possesses to perfection the marvellous faculty of imitation, that has given such celebrity to the Virginian Mocking-bird, and I cannot believe that the Mocking-bird of the North, in its own song, can surpass or even equal the *Calandria blanca*. This bird disappears from the vicinity of the Carmen at the end of summer; but it probably does not go very far, as it by no means belongs to a

* *Stigmatura flavocinerea* (Burm.).—P. L. S.
† *Diuca minor*, Bp.—P. L. S.

migratory family: probably it passes the winter on those great plains covered with forest west of Bahia Blanca. The bird is called *Calandria blanca* in Patagonia; but the same name is also given, and more appropriately, to another species, which I have not seen; but as the descriptions of seven or eight different persons, who have observed it, and spoken to me about it, all agree, I have no doubt of its existence. It is found, they say, in the thickets near the Rio Colorado, is like the common Calandria in shape and size, but its plumage is entirely of a snowy white. All the Guanchos whom I have heard speak of it say precisely the same thing, that it is a most beautiful bird, a fine singer, and is invariably to be seen in one particular little wood through which the road from Bahia Blanca to Patagonia runs.

7. [MUSCISAXICOLA MENTALIS (Lafr. et D'Orb.), Scl. Cat. A. B. p. 205.—P. L. S.]

This little dark grey bird I first saw in the month of June, and I afterwards met with several small flocks of them. I am disposed to think, from my never having seen one till the depth of winter, that they migrate towards the north from the extreme southern portion of the continent in the cold season. In its habits, so far as I observed them, as well as in conformation, it closely resembles many other species of *Tænioptera*: it has a rapid, easy flight, goes in small flocks, is fond of alighting on smooth barren spots of earth, over which the individuals of the flock immediately scatter, running about like Plovers in all directions with great rapidity; it also occasionally assumes the habit of the true Flycatcher, darting from its position on a dry stalk or spray to catch an insect on the wing. It is a shy bird, and has no song but the low plaintive note common to all the birds of its genus.

8. [TÆNIOPTERA RUBETRA, Burm.; La Plata-Reise, ii. p. 461. —P. L. S.]

I saw this pretty brown and white *Tænioptera* in summer and autumn; but it is not a common bird. They go in small scattered flocks, and frequent level plains abounding in low bushes. In notes, flight, and manner of feeding they resemble most of the other species of *Tænioptera*, but are not so wild or active as the last.

9. [TÆNIOPTERA MURINA, Lafr. et D'Orb.—P. L. S.*]

This species, like the preceding, lives singly or in pairs; in winter it leaves the Rio Negro, but reappears there early in the spring.

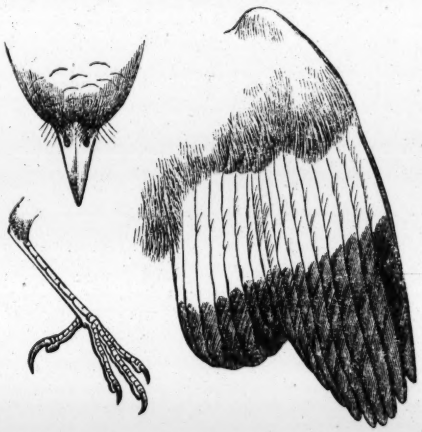
10. [CNIPOLEGUS HUDSONI, sp. nov. (Plate XXXI.)

Niger unicolor: remigum pogoniis internis pro dimidio basali et maculis plumarum hypochondrialium albis: rostro obscure plumbeo, pedibus nigerrimis: remigibus tribus externis valde angustatis, acutis: long. tota 6, *alæ* 2·8, *caudæ* 2·6, *tarsi* 0·8.

Hab. Rio Negro of Patagonia (*Hudson*).

* *Pepoaza murina*, D'Orb. Voy. p. 348.

This new species is of about the same size as *C. cyaneirostris*, but has a large portion of the bases of the remiges on their inner web white, as in *C. aterrimus*. From *C. aterrimus*, however, it is readily distinguishable by its smaller size, by the peculiar narrowed remiges, and by the white spotting of the flank-feathers. This last character is not found in any other species of the genus.



Bill, foot, and under surface of left wing of *Cnipolegus hudsoni*.

Mr. Hudson sends four male specimens of this new species, which I propose to name after its energetic discoverer. It would be very interesting to get the female also.—P. L. S.]

This bird makes his appearance late in September in the close thickets bordering on the Rio Negro; he is usually seen perched on the topmost twig of a bush watching for insects, after which he darts with great swiftness. He has one most remarkable habit: suddenly quitting his perch he glides two or three times close round it, uttering at the same time a peculiar sharp note. It also frequently utters a sharp, rapid chirping, but has no song. It is a very lively little bird; and when, flying, it displays the white bars on its wings it has a strange and pretty appearance.

11. SERPOPHAGA, sp.*

This little bird does not migrate, lives in pairs, and frequents bushes, where it is never seen at rest, but hops incessantly from twig

* This is the *Phylloscartes flavocinereus* of Burmeister, La-Plata Reise, ii. p 455. Mr. Hudson's skins agree with my specimen from Mendo a (*Weisshaupt*). It is, however, most nearly allied to *Stigmatura budytoides* (Lafr. et D'Orb.), Scl. et Salv. P. Z. S. 1866, p. 188; and I propose to place it in the same genus, as *Stigmatura flavocinerea*.—P. L. S.

to twig in a leisurely delicate manner, the male and female all the time uttering a variety of low notes, as if conversing together. They have also a shrill, impetuous song, uttered by the two birds in concert.

12. SERPOPHAGA*.

There is a considerable difference between the appearance of this bird and the last; he is, perhaps, the least of this tribe, and carries a distinguishing badge in the long curling crest that adorns his head. But in all his habits he closely resembles the other bird. Indeed, with one exception, all the species belonging to this group with which I am acquainted, so closely resemble each other in habits that a description of one will very nearly apply to the others. They are residents all the year in the places they frequent, live in pairs, answer each other in low chirping notes, have also long notes, like squealing of mice, sing in concert, never rest from their easy, calm motions, and build beautiful deep little nests. The one exception I mentioned is *S. nigricans*, a bird differing in many of his habits from the others.

13. THE GALLITO†.

Is very well known to the residents on the Rio Negro, and derives its vernacular name of *little cock* from the manner of carrying the tail elevated like the domestic fowl.

I found it exceedingly numerous in the thickets near to the town of Carmen; but following up the river it becomes scarcer. It is in its habits an amusing bird, scarcely possessing the power of flight, but so ready to take alarm, swift of foot, and fond of concealment, that it is often very difficult to get a sight of it. No sooner do they spy out an intruder in the thicket, than the alarm is spread, each bird hopping up into a bush, and uttering incessantly, at intervals of three or four seconds, a loud, hollow chirrup, and at times a violent scolding cry, several times repeated. If the bird finds himself approached, he immediately springs to the ground and runs off with amazing rapidity to a safe distance. Then he again ascends a bush and resumes the angry note. Three or four times I have seen one raise itself from the ground, and fly several yards with a low feeble flight; but whenever I chanced to come on one in an open place I found that I could overtake it running, without the bird being able to raise itself. They often fly down from a bush, but always ascend it by hopping from branch to branch.

The nest is built in the centre of a bush, from four to six feet above the ground; it is domed, has a small entrance, and is constructed entirely of a dry hair-like grass. They lay four white eggs.

14. [SYNALLAXIS SORDIDA, Less.; Scl. Cat. A. B. p. 153.—P. L. S.]

This little bird is very common in the woods of Patagonia, goes

* *Anæretes parulus* (Kittl.), Scl. Cat. A. B. p. 212.—P. L. S.

† *Rhinocrypta lanceolata* (Geoff.), Burm. La-Plata Reise, ii. p. 471.—P. L. S.

in pairs, and builds a large nest of sticks with a narrow long entrance, and lays four pointed white eggs; but there is as little in its habits or language, as in its form or colour, to distinguish it from many other members of the extremely monotonous tribe to which it belongs.

15. [SYNALLAXIS PATAGONICA, D'Orb. Voy. p. 249.—P. L. S.]

This bird resembles the last in colour and size, but is distinguished by its short tail, which it carries elevated like the Wren. It hops with great rapidity over the bare ground, and feeds much about the roots of dwarf bushes*.

16. [SYNALLAXIS SULPHURIFERA, Burm. P. Z. S. 1868, p. 636. —P. L. S.]

I send you two, unfortunately much injured, specimens of this bird, which appears to me identical with Burmeister's *S. sulphurifera*. It must be exceedingly rare in Patagonia; for this pair were the only ones I saw during my sojourn in that country, though I constantly sought for them in the most likely places. You will observe that its affinities are with the *Limnornis curvirostris*; in note and habits it also closely resembles that bird.

The male and female keep together, and glean for insects about the roots of reeds and giant grasses, and when approached run to their tops, uttering shrill, angry notes.

17. SYNALLAXIS STRIATICEPS, Lafr. et D'Orb.

This species is rare in Patagonia, and seems to be identical with the northern species.

18. SYNALLAXIS ÆGITHALOIDES, Kittl.

Perhaps if you compare this species, of which I send several examples, with specimens from the Plata, you will detect some difference†. The Patagonian bird differs considerably in language and habits from the Buenos-Ayrean bird; the latter is solitary, the former gregarious, often being seen in loose flocks of forty or fifty individuals.

19. [UPUCERTHIA DUMETORIA, Geoffr. et D'Orb.—P. L. S.]

This bird is exceedingly common wherever I have been in Patagonia; I mentioned in a former letter having obtained a pair of them in Buenos Ayres.

* Mr. Hudson likewise sends two specimens of "another species of *Synallaxis* with short tail, which closely resembles, in habits as well as structure, the species No. 15," *i. e. S. patagonica*. These birds are referable to *S. modesta*, Eyton, Scl. Cat. A. B. p. 153. Mr. Hudson shot them "in the valley of the river, 60 miles distant from the locality in which the other species was obtained."—P. L. S.

† I have compared Mr. Hudson's skins with specimens from La Plata and from Chili, but can see no differences worth dwelling upon. But see D'Orbigny's remarks, Voy. Ois. p. 243.—P. L. S.

20. [HOMORUS GUTTURALIS (Lafr. et D'Orb.).—P. L. S.]

This homely and interesting bird is, perhaps, a new species; it resembles the *Homorus unirufus* of the northern states of La Plata; but it is of a paler brown, and the eye is dark instead of white as in that species. It frequents open plains abounding in low, thorny, and widely scattered bushes, and on the approach of a traveller shows itself on the summit of a bush, with crest erect, and uttering a succession of sharp, angry chirps; it also has, when much alarmed, a shrill, trilling scream like that of the *H. unirufus*. They are seen in pairs or in families of five or six individuals at intervals during the day; the male and female perform a chorus of notes so powerful that they may be heard distinctly a mile away. Its flight is low and feeble; but it runs very rapidly on the ground, and subsists principally on insects extracted from the earth, and decayed bark about the roots of trees and shrubs. This bird builds a nest extraordinary for its size and strength; it is placed in the middle of a low, thorny, and widely spreading bush; it is perfectly round, the lower part just raised only a few inches above the ground; the depth of the whole nest is usually from 4 to 5 feet, the cavity inside is 1 foot in depth. The opening is on the side and small, and has in front of it a narrow arched gallery resting on the horizontal twigs, and 13 or 14 inches in length. The nest is composed entirely of thick sticks, and is so compactly built that I had hard work to demolish one by thrusting the barrel of a long musket into it and prizing it up by pieces. I also, to test the strength of a nest, stood on one for some time, stamping my heel on it with great force, without injuring it in the least.

21. [COLUMBA MACULOSA, Temm.—P. L. S.]

This bird appears in winter in the settled parts of the Rio Negro; they come in large flocks, and gather in great numbers on the ploughed fields, eager to devour the wheat; so that the farmers, when sowing broadcast, have to be constantly firing at them, or to keep trained dogs to chase them from the fields. When on the ground, the flock keeps very much crowded together, all the birds running about with great rapidity, and eagerly snatching up the grain or seed they find. The lively, brisk manner of a Patagonian Pigeon is in strong contrast with the slow, stately steps and deliberate manner of picking up its food of the Buenos-Ayrean species*. Its song is composed of notes equal in length and number to that of the Buenos-Ayrean bird; but the voice of the former is exceedingly hoarse, while that of the latter is the most agreeable dove-melody I have ever heard. They retire on the approach of summer, and probably breed in the vast forests of Western Patagonia.

22. [EUDROMIA ELEGANS, D'Orb. et Geoffr.—P. L. S.]

I send several specimens of the *Martineta*, a handsome and interesting bird. It is found in the north-western portion of

* *i. e. Columba picazuro*: v. Sel. et Salv. P. Z. S. 1868, p. 143.—P. L. S.

the Plata States, and again we met with it south of the Rio Colorado, and in the vicinity of the Rio Negro it is abundant; ours were on the high bushy grounds. But before speaking further of this species I will give a rapid sketch of its congener of the Pampas, the *Perdiz grande* *.

This bird is common on the Buenos-Ayrean plains, wherever the long grasses abound. I do not know how far north it extends; but south it is common as far as the Colorado. South of this river it becomes very rare, and disappears before the Rio Negro is reached. This bird has no cover but the giant grasses, through which it pushes like a Rail; and wherever the country is settled it soon disappears, so that it is now extinct over a vast portion of this province.

It is solitary in its habits, conceals itself in the grass very closely, and flies with great reluctance. I doubt if there is anywhere a bird with such a sounding flight as this; and I can only compare the whirr of its wings to the rattling of a light vehicle driven at great speed over a hard road. From the moment it rises till it again alights there is no cessation in the rapid vibration of the wings; but like a ball thrown by the hand the bird goes gradually sloping towards the earth, the distance it is able to accomplish at a flight being from 1500 to 2000 yards. This flight it can repeat when driven up again as many as three times, after which the bird can rise no more. The call of the *Perdiz grande* is heard at all seasons of the year; on pleasant days, and invariably near sunset, it is uttered while the bird sits concealed in the grass, many birds answering each other; for though I call the *Perdiz grande* a solitary bird (they rarely being seen in company), several individuals are mostly found living near each other. The song or call is composed of five or six long notes, with a mellow, flute-like sound, and so impressively uttered and sweetly modulated that it is, perhaps, the sweetest bird-music heard in the Pampas.

The *Perdiz grande* lays five large and almost round eggs, of a dark wine-purple colour.

The *Martineta*, from its size and mottled plumage, somewhat resembles the *Perdiz grande*, the most apparent exterior difference being the redder plumage and longer bill of the latter, and the long, slender crest of the former, which, when excited, the bird carries direct forward, like a horn. There is, however, an anatomical difference between the species of far more consequence. The structure of the intestinal canal in the *Martineta* is most extraordinary, and totally unlike that of any other bird I have ever dissected; the canal divides near the stomach into a pair of great ducts that extend almost the entire length of the abdominal cavity, and are thickly set with rows of large membranous clam-shaped protuberances.

The *Martineta* frequents the elevated tablelands, and are found where patches of scattered dwarf scrub occur among the close thickets, and subsist on seeds and berries. They are extremely fond of dusting themselves, and form circular nest-like hollows in the ground for that purpose; these hollows are deep and neatly made,

* *Rhynchotus rufescens*, Temm.—P. L. S.

and are visited by the birds every day. They go in coveys of from half a dozen to twenty individuals, and when disturbed do not usually take to flight, but start up one after another, and run off with amazing swiftness, uttering as they run shrill, squealing cries, as if in great terror. Their flight, though violent, is not so sounding as that of the *Perdiz grande*, and differs remarkably in another respect: every 20 or 30 yards the wings cease their vibration, remaining motionless for a second, when the bird renews the effort. The flight is accompanied with a soft wailing note that appears to die away, and again swell as the flapping of the wings is renewed. Thus the flight is a series of rushes, rather than a continuous rush like that of the *Perdiz grande*. The call of this species is never heard in winter; but in the month of September they begin to utter in the evening a plaintive, slightly modulated whistle; as spring advances the coveys break up, and their call is heard on every hand, and often all day long from dawn till after dark. The call varies greatly in different individuals, from a single whistle into a song of five or six notes, resembling that of the *Perdiz grande*, but inferior in compass and sweetness. They begin to breed in October, and lay in the middle of a small, isolated shrub: the eggs are from twelve to sixteen; but the former number is not common; they are a trifle smaller than those of the common Quail, possess a fine polish, and are deep beautiful green in colour.

23. [PERDIZ CHICHO *.]

You will, perhaps, have doubt about this bird being a new species; so great is its resemblance to the *Perdiz comun* [*i. e. Nothura maculosa* (Temm.) P. L. S.], the Lesser Partridge, common everywhere on the Pampas. After arriving in Patagonia, I was told by several persons residing there that there were two species of small Partridge: one I found to be the *Perdiz comun* of Buenos Ayres, which frequents only the valley of the Rio Negro; the other was the smaller species, of which I send you several examples, and found only on the high tablelands. The adults of the last species resemble the young of the former; and after having observed them for several months, I am satisfied that they are not identical, nor varieties; for they differ not only in size and colouring, but in habits.

I would far sooner consider the *Progne chalybea* and *P. purpurea*, identical in size, language, and habits as these birds are, one species, than *Perdiz chico* and *Perdiz comun*. I will first speak of the *Perdiz comun*. This bird, so abundant everywhere on the Pampas, closely resembles, in all its habits, the *Perdiz grande*, living entirely amongst grass, as the Rail does amongst reeds: they are seen singly; but a number of individuals are usually seen in proximity. They are tame in disposition, and move in a leisurely manner, uttering as they walk or run a succession of soft whistling notes. When numerous

* I have compared Mr. Hudson's specimens with the typical example of *Nothura darwini*, G. R. Gray, List of Gallinæ, p. 104, and believe them to be identical. The type of *N. darwini* is from Bahia Blanca, and is spoken of by Darwin (Voy. Beagle, Birds, p. 119) as *N. minor*. P. L. S.

it is unnecessary to shoot them, as any number can be killed with a long whip or stick. This species has two distinct songs or calls, pleasing to the ear, and heard all the year round: one is a succession of twenty or thirty short, impressive notes of great compass, and ended by half a dozen rapidly uttered notes, beginning loud, and sinking lower till they cease; the other call is a soft continuous trill, appearing to swell mysteriously on the air; for the hearer cannot tell whence it proceeds; it lasts several seconds, then seems gradually to die away.

The female lays five or six eggs, in colour like those of *Perdiz grande*. The valley of the Rio Negro, usually nine or ten miles in width, is a flat plain, resembling the Buenos-Ayrean Pampa; and wherever long grasses and reeds abound the call-note of the *Perdiz comun* is heard winter and summer; but outside of the valley I have never met with it.

The *Perdiz chico* is nowhere very numerous, but seems thinly and equally distributed everywhere on the high bush-covered table-lands, and, like the *Martineta*, is partial to places abounding in thin scrub. They have a shy disposition, and, when approached, spring up and run away with the same appearance of terror exhibited by the *Martineta*. Sometimes, when running, they utter low whistling notes like the *Perdiz comun*; their flight is higher, and produces far less sound than that of the *Perdiz comun*. They have but one call-note—a succession of short notes, like those of the other species, but without the quick concluding notes; this call is only heard in the breeding-season. Its eggs are like those of the Pampa bird. It is never found in the moist, grassy places frequented by the *Perdiz comun*.

[As an Appendix to Mr. Hudson's interesting notes I think it will be of use to give a list of the species of which he has sent specimens to me from the Rio Negro, arranged in systematic order. These are:—

PASSERES.

1. *Turdus falklandicus.*
2. *Mimus triurus*, Lafr. et D'Orb.
*3. —— *patachonicus*, Lafr. et D'Orb.
4. *Anthus correndera.*
5. *Progne purpurea.*
6. *Gubernatrix cristatella.*
*7. *Diuca minor*, Bp.
8. *Poospiza nigro-rufa.*
9. *Phrygilus fruticeti.*
10. *Zonotrichia pileata.*
11. *Embernagra platensis.*
12. *Sturnella militaris.*
13. *Upucerthia dumetoria.*
14. *Phleocryptes striaticeps.*
15. *Leptasthenura ægithaloides.*
16. *Synallaxis sulphurifera*, Burm.
*17. —— *patagonica*, Lafr. et D'Orb.
18. —— *sordida* (Less.).
*19. —— *modesta*, Eyton.
20. *Homorus gutturalis* (Lafr. et D'Orb.).
21. *Rhinocrypta lanceolata.*
22. *Tæniopteræ coronata.*
23. —— *rubetra*, Burm.
*24. —— *murina*, Lafr. et D'Orb.
*25. *Cnipolegus hudsoni.*

26. *Muscisaxicola mentalis.*
27. *Stigmatura flavo-cinerea* (Burm.).
28. *Anæretes parulus.*
29. *Phytotoma rutila.*

PICI.

30. *Colaptes agricola*, Malh.

PSITTACI.

31. *Conurus patagonus.*

ACCIPITRES.

32. *Harpyhaliaëtus coronatus.*
33. *Buteo erythronotus.*
34. *Geranoaëtus melanoleucus.*
35. *Bubo virginianus.*
36. *Glaucidium nanum.*

ANSERES.

37. *Bernicla magellanica.*
38. —— *poliocephala.*
39. *Erismatura ferruginea.*

HERODIONES.

40. *Phœnicopterus ignipalliatus.*
41. *Ibis melanopis.*

COLUMBÆ.

42. *Columba maculosa.*

GRALLÆ.

43. *Ægialitis falklandica.*
44. *Oreophilus totanirostris.*

BRACHYPTERI.

45. *Podiceps major.*
46. —— *rollandi.*

TINAMI.

47. *Eudromia elegans.*
*48. *Nothura darwini*, G. R. Gray.

So far as I know, two naturalists only have hitherto collected birds in this locality—the late Professor d'Orbigny and Mr. Darwin; and the only authorities we have to refer to, on the birds of this district, are the former's 'Voyage dans l'Amérique Méridionale,' and the third volume of the 'Zoology of the Voyage of the Beagle.' It would appear, however, that one or other of his predecessors were fortunate enough to obtain specimens of nearly all the birds peculiar to the district, leaving to Mr. Hudson only the little *Cnipolegus*, which I have named after him.

The total number of species in Mr. Hudson's collection from the Rio Negro is forty eight. Of these the following seven, so far as our present knowledge extends, have not been met with elsewhere:—

Mimus patachonicus.
Diuca minor.
Synallaxis patagonica.
—— *modesta.*
Tænioptera murina.
Cnipolegus hudsoni.
Nothura darwini.

So far as we can judge from Mr. Hudson's collection, the avifauna of this part of Patagonia is more akin to that of the district round Mendoza, in the extreme west of the Argentine Republic, than to that of the vicinity of Buenos Ayres. In Mr. Hudson's collection we find examples of the following species which are also met with in the former, but not in the latter locality:—*Mimus triurus, Progne purpurea, Homorus gutturalis, Rhinocrypta lanceolata, Stigmatura flavocinerea, Phytotoma rutila*, and *Eudromia elegans.*

The Chilian element in this branch of the avifauna of the Rio

Negro seems to be not quite so decided, being represented only by *Turdus falklandicus*, *Phrygilus fruticeti*, *Sturnella militaris*, *Glaucidium nanum*, and *Diuca minor*, a small representative form of *Diuca cinerea*. These have, in all probability, come up from the south, the avifauna of Southern Patagonia being almost purely Chilian.—P. L. S.]

4. Descriptions of two new Pheasants and a new *Garrulax* from Ningpo, China. By R. Swinhoe, F.Z.S., H.M. Consul at Ningpo.

[Received March 18, 1872.]

From the mountainous region of this province (Che-Kiang) I have procured a truly beauteous Pheasant, perhaps the loveliest of that lovely group. It is smaller than *Phasianus torquatus*, and has comparatively shorter wings and longer tail. The colouring of its head and tail recall *P. reevesii*, its coppery back and breast the *P. sæmmeringii* of Japan, and the glowing maroon on its scapulars the *Euplocamus swinhoii* of Formosa; but its curiously marked lower back and white-barred wing are suggested by no other species of this family to my knowledge, and its white underparts no other true Pheasant possesses. Its mate is a smaller bird, and in coloration more of a Grouse than a Pheasant; but in her black under neck and in the marks of her lateral rectrices she shows her relationship to her lord. Possessed of so many striking characters, it would be easy to find an appropriate name for so marked a species; but on glancing down the list of Pheasants I find that not one bears the name of Elliot; and it strikes me it would be a wrong to allow his magnificent work on the group to close without the figure of a bird dedicated to himself: I therefore propose to name this firstfruits of my researches in this Province

Phasianus ellioti, sp. nov.

Male.—Crown of head dusky olive, centred darker; a white streak over eye, narrowly bordered with black; face-skin shaped and coloured like that of *P. torquatus*, but quite bare; lower eyelid covered with minute white feathers, edged below with black; sides and back of neck bluish grey, becoming white as it descends downwards and sidewards; ear-coverts deep olive-grey, the feathers rather long and disintegrated; feathers on rostral edge of face-skin, chin, and throat black, burnished with steel-blue as it descends to edge of breast and forms a narrow collar round white tippet of neck. Back and breast yellowish chestnut, deeper round the collar and on lower breast; each feather with a crescent of black across its centre, and with broad rounded loosely webbed margin reflecting a rich metallic golden hue; those of the lower breast crossed with black and with white; belly pure white, the flank-feathers being irregularly barred

with black and white, sometimes associated with chestnut; axillaries white, marked with brown; under tail-coverts very deep chestnut, with more or less black. Upper scapulars black, broadly tipped with white, forming a broad shoulder-bar; the rest of the scapulars and the lesser wing-coverts deep maroon-chestnut, the margins of the feathers reflecting a fiery metallic tint; a broad daub of steel blue-black occurs on the shoulder at the edge of scapulars; greater wing-coverts deep chestnut, with a black bar succeeded by a broad white tip, forming a very distinct white band across the wing; tertiary quills coloured in the same manner, but with the tips tinged with yellowish and mottled with black; secondaries similar to last, with inner or hidden half of feathers blackish brown, and the broad half of outer web mottled with same; primaries brown, the outer webs and tips more or less mottled reddish buff; lower back and rump steel-black, beautifully barred with white, each feather having a central bar, a more or less distinct basal bar, and a tip of white; some of these feathers near the tail are tipped with cream-colour instead of white. Upper tail-coverts grey, minutely mottled with black, with broad bars of chestnut bordered with black. Tail barred alternately with stone-grey ($\frac{1}{2}$ inch) and chestnut (1 inch), the latter bordered basally with black; on the lateral rectrices the black border broadens, and some of the bands are bordered both on forward and basal edge.

Fresh male shot towards end of November 1871.—Entire length 30 inches; tail 17·5, of sixteen greatly graduated feathers, the two centrals exceeding the next by 5·75; wing 9 inches; tarse 3; middle toe and claw 2·4. Bill lemon horn-colour; iris light chestnut; legs satiny bluish grey, or pale clear lead-colour; face-skin bright scarlet; spur long and sharp. Crop crammed with seed-pods, seeds, berries, and leaves in much variety. Served on table its flesh was white, firm, close-grained, and tender, but to my taste not equal in flavour to that of the *P. torquatus* about Ningpo.

Female.—Skin round eye bare and crimson, sprinkled with a few small feathers; lower eyelid clothed with minute cream-coloured feathers; loral space and head reddish cream, with the crown chestnut-brown, the feathers centred with black; throat and under neck black; face and rest of neck grey, washed with fawn-colour, the feathers below the bare skin dotted with black; breast fawn-colour, the feathers margined with white and banded with black spots; belly white, the flanks irregularly barred with dusky fawn-colour, and occasionally with narrow black, some feathers having white central streaks; under tail-coverts black, banded at times with deep chestnut, and all broadly tipped with white; axillaries fawn, with cream-white margins, the under wing-coverts having such margins bordered inwardly with blackish. Dorsals greyish chestnut, with an arrow-head centre of white to each, and one narrow and one broad bar of black with a tip of olive grey; scapulars light yellowish brown, mottled with blackish and patched on inner webs with black and tipped with whitish; wing-coverts chestnut-brown, margined, except about the shoulder, with whitish, and irregularly mottled and

patched with black; winglet and primaries deep brown, the former spotted with reddish chestnut, the latter on the outer webs and at tips with brownish buff; secondaries brown, with whitish margins mottled with reddish buff, the tertiaries being yellowish brown with pale margins mottled with black and with a black patch on each outer web; lower back and rump yellowish brown, mottled with black and buff, the upper tail-coverts having central blotches of black. The two central tail-feathers brownish grey finely mottled, banded with seven obscure bars of darker brown, and terminating with a black spot and white tip; on the next feather chestnut occurs at the base of the spot, and tinges the bar below it; on the next again the two terminal bars are chestnut; and on those that follow the chestnut occupies almost the whole extent of feather, ending with a black bar and a conspicuous white tip.

Fresh female shot towards end of December 1871.—Entire length 20 inches; wing 7·9; tail 6·8, of sixteen feathers, the four centrals equal and longest, the rest pretty equally graduated about half an inch between each. Iris reddish brown; bill ochreous horn-colour; legs light leaden, with pale claws. Tarse 2·5; middle toe and claw 2·25.

The same mountains have also yielded a Pucras Pheasant remarkable for the absence of the golden neck-spot which adorns the *Pucrasia xanthospila* of Northern and Western China (Mantchuria to Szechuen). It is of the same model as the other two closely allied species, *P. macrolopha* of the Himalayas and the above-mentioned, but differs sufficiently from either to be recognized as a third race of this curious type. I propose to dedicate this discovery to Mr. Charles Darwin.

PUCRASIA DARWINI, sp. nov.

Male.—Head coloured as in the other two, but the bronze encroaching more on the crown; central occipital crest yellowish brown, with central yellowish streaks; lower eyelid covered with minute pure white feathers; white spot on side of nape as usual. Feathers of the hind neck white, delicately shaded over, and with four black streaks converging to tip; greyer on the back and rump, the lines opening into mottling; some of those covering the rump having a V-mark of black with pale yellowish centre and light chestnut shading. The long uropygials and central tail-feathers greyish white, with a broad margin of chestnut, flanked inwardly with black and outwardly with narrow white. Rectrices pale French or Kestrel grey, bordered along the sides with black, edged with grey, and barred at the end with black conspicuously tipped with white; in the outer feathers the black border is confluent with the bar, in the more central it is broken by the grey extending across; all have more or less black about the basal two thirds of the stem. The two central tail-feathers coloured like the tail-coverts, but clearer and brighter. Median feathers of the underparts from the neck downwards deep chestnut as usual, lighter and dingier on the abdomen; lateral feathers reddish

buff, with four converging black streaks, the two inner ones breaking up into mottling; tibial and latero-abdominal with outer streak very broad. Under tail-coverts black, marked more or less with deep chestnut, and tipped with a conspicuous white spot. Scapulars and wing-coverts varying in depth of chestnut tint, and in breadth of black lines; many of the former and secondary coverts black, with yellowish central streak and margined with chestnut. Primary quills brown, margined with buff; secondaries more mottled, with the edging more chestnut; tertiaries mottled and patched with buff, chestnut, and black, with yellowish central streak; axillaries and under wing-coverts mottled minutely, and the former streaked with light black.

Compared with a specimen of *P. xanthospila* from Pekin, occipital crest much darker, some of the feathers with a central yellow streak; cuneate feathers of the neck much shorter, without tinge of yellow, those of back and rump much broader; sides of the body washed with a warm sienna instead of lemon-white, and more narrowly streaked with black; rump-feathers shorter and broader, mottled instead of streaked with black; a single line of black feathers running down the middle of the rump, margined with grey and patched in the centre with chestnut with a pale streak running through; of a larger size, with larger legs and feet; wings and tail differ in detail of colour and markings.

Fresh male shot about the middle of December.—Length 24 inches; wing 9·25; tail 9·5, consisting of fourteen rectrices and two centrals, which in appearance are but a continuation of the tail-coverts advancing *gradatim* to cover the tail; tarse 3·4; middle toe and claw 2·9. Bill black; iris deep brown; legs and toes deep blackish grey. Crop full of bamboo-leaves, with a leaf or two of other trees and a few berries.

A younger bird with short spur has the chestnut on belly much paler, the black of the throat is mottled with white, and the crown of the head is browner.

Fresh female shot in beginning of January 1872.—Entire length 19·25 inches; wing 8; tail 6; tarse 2·9, with a tubercle on the inner side towards its backward edge, ·6 above hind toe; middle toe and claw 2·5. Bill blackish brown on whole of upper mandible and tip of lower, bluish grey on rest of latter; inside of mouth yellowish flesh-colour, yellower on the tongue, which is broadly sagittate; skin round eye deep purplish brown; lower eyelid covered with minute white feathers; legs and claws light leaden, with a faint yellowish tinge; claws pale yellowish brown.

Closely resembling the female of *P. xanthospila*. The feathers of the underparts are marked more distinctly with black. Much more black occurs on the vent-feathers, and the chestnut there is much deeper-coloured; the dorsals are a great deal more blotched with black; and the line of black-spotted feathers extends down the rump as in the male; the wing is more richly marked and mottled; and the tail presents some differences.

I will take the opportunity of introducing a new *Garrulax* from the same mountains as the above. It belongs to the group of necklaced Laughing-Thrushes, and has close allies in *G. pectoralis*, Gould, and *G. moniliger*, Hodgs., of the Himalayas.

GARRULAX PICTICOLLIS, sp. nov.

Loral region, extending into a streak over the eye, and a broad mark under eye, throat, and middle of the belly white; cheek black, spotted with white; a black line from behind eye and another from base of bill meet round the ear and extend in a broad band down side of the neck nearly meeting on breast, where it is broken by buff feathers, which are only tipped with black; upper parts yellowish olive-brown, rufous on the back of the neck and hind edge of the necklace; sides of the breast and belly robin-rufous, paler on the tibiæ and vent. Wings coloured like the back; the primaries and secondaries with their inner webs blackish brown, the outer webs of many of the former olive-buff near their tips, otherwise margined with dark olive-brown; axillaries buff, with a few black spots on the carpal edge of wing, and dark primary under-coverts; under wing whitish, tinged with buff. Tail of twelve feathers, the centrals coloured as the back, with indistinct bars of deeper shade; the fifth pair similar but with reddish ochre tips, the remainder with broad oblique black band, very broadly tipped (one inch and more) with rufous buff.

The above description is taken from an adult female procured near the end of November 1871. The fresh bird measured, length 12½; wing 5·4, the five first quills graduated, 5th, 6th, and 7th equal and longest, 8th a little shorter; tail 5·75, outermost feather 1·6 the shortest, outer five graduated, the fifth and centrals equal; tarse 1·9. Upper mandible and broad tomial edge of lower bluish black, rest of lower horny, tinged with bluish; rim of eyelid blackish grey; iris chestnut; inside of mouth black; legs leaden, with paler claws.

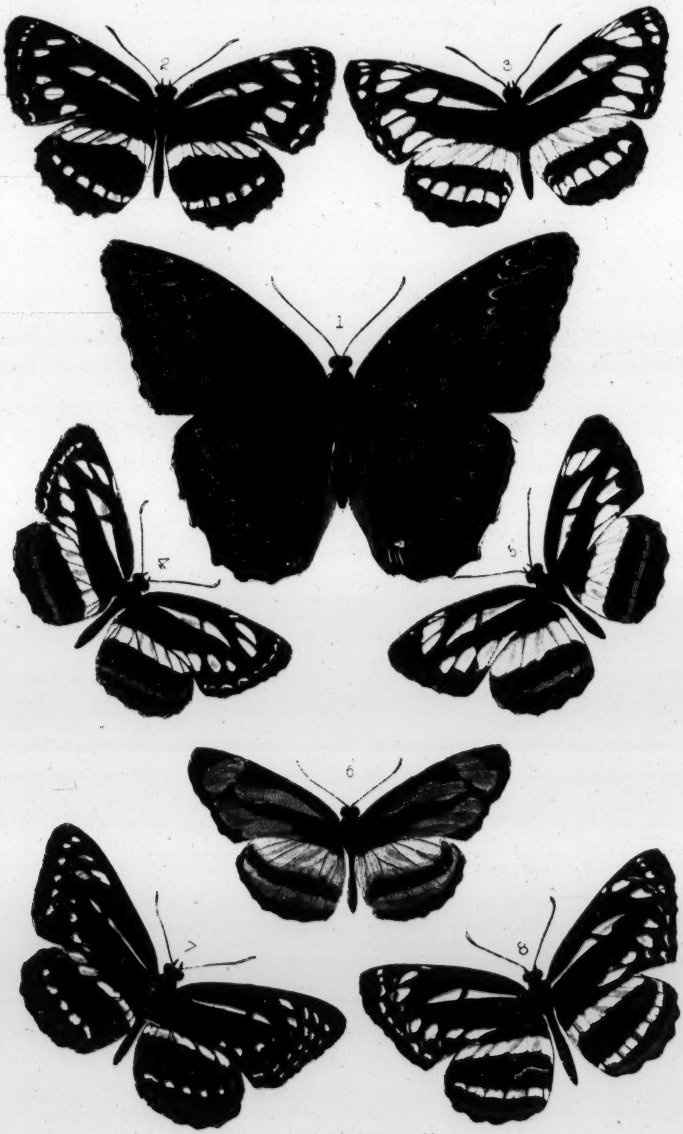
Another female, apparently younger than the last, has the necklace deep bluish grey shaded with black where it crosses the breast; inside of mouth dark green, with flesh-coloured tongue; rim of eyelid tinged with yellow. Length 12·9; wing 5·2; tail 5·6; tarsi 2·2.

A bird, still younger, of the male sex has the inside of mouth orange-yellow; rim of eyelid the same; necklace mixed with much bluish grey and widely broken on breast, the intermediate feathers not tipped with black; underparts light.

The greater or less amount of black and grey in the necklace seems due to individual variation, rather than to sexual difference or to age.

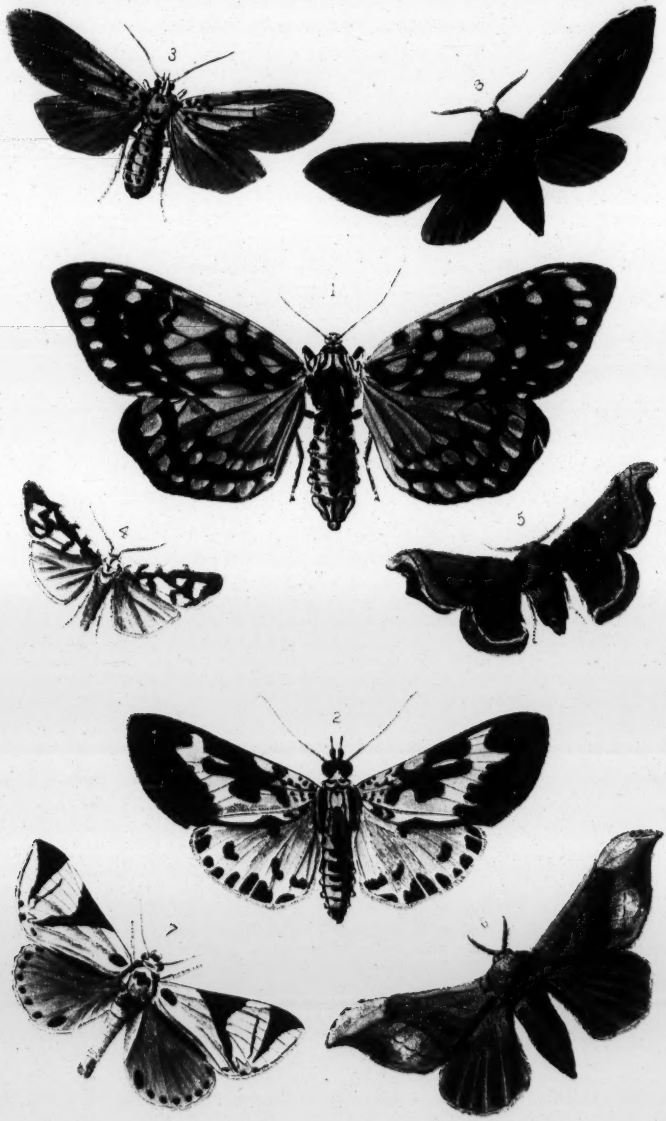
The stomachs of the specimens dissected contained smooth caterpillars, grasshoppers, seeds, and pulp of fig-like berries.

BRITISH
MUSEUM
280673



E.W.Robinson, Del. et Lith. 1872




3
3
1
4
5
2
7
6


BRITISH
2800 78
MUSEUM



Mintern Bros. imp.

NEW INDIAN LEPIDOPTERA

5. Descriptions of New Indian Lepidoptera.

By Frederic Moore.

[Received March 19, 1872.]

(Plates XXXII.–XXXIV.)

Tribe Papiliones.

Subfam. Satyrinæ.

Genus Lethe, Hübn.

Lethe sihala.

Male. Upperside dark greenish brown: fore wing with two very indistinct or obsolete dusky white apical spots, and a tuft of long blackish brown hairs near posterior angle; hind wing with a marginal series of indistinct black spots. Underside: basal half dark brown, outer half pale brown, being divided on the fore wing by an oblique chalybeate streak, and on the hind wing by a medially produced dark brown line; a submarginal series of four very indistinct ocelli on fore wing formed of a central black dot and two chalybeate rings; a series of six larger ocelli on hind wing, formed of a black spot with a white central dot and fulvous outer ring, each being again encircled by a chalybeate border; both wings also with a dark brown chalybeate-bordered subbasal transverse line.

Female. Upperside brown, palest at the base: fore wing with a paler brown streak along hind margin; a broad white medial band obliquely from costa and terminating before a white spot near posterior angle; a small white apical spot and two indistinct streaks below it; an indistinct series of blackish submarginal spots: hind wing with a submarginal series of five black spots, the middle spot being very small, the upper spots with broad irregular whitish brown borders, the two lower with pale brown rings and white centres. Underside brown at base, outer borders paler; oblique band as above: hind wing as in male: subbasal transverse line chalybeate-bordered, the transverse irregular medial line with whitish brown outer border.

Expanse, ♂ 2¼, ♀ 2½ inches.

Hab. Newera Eliya, Ceylon. In Coll. Capt. Hutchison and F. Moore.

Note.—Nearest allied to *L. dynsate*, Hewits.

Genus Callerebia, Butler.

Callerebia orixa.

Male. Upperside dark chocolate velvety brown, with an indistinct narrow submarginal black line: fore wing with a large subapical ocellus, composed of a round black spot encircled by a broad bright ferruginous ring, and centred with two white dots: hind wing with a small similar ocellus near anal angle. Underside brighter brown:

fore wing mottled at the apex; ocellus as above, with a posterior dusky border: hind wing with numerous greyish white transverse short strigæ, which are most numerous from the abdominal margin and less frequent before and below the apex; two very small contiguous anal black spots encircled by a ferruginous ring, each without a central white dot.

Expanse 2¼ inches.

Hab. Khasia Hills (*Major Godwin-Austen*). In Coll. F. Moore.

This species may be known from *C. annada* by the ocellus on the fore wing being twice as large, much more prominent, and brighter-coloured.

Genus Libythea, Fabr.

Libythea rama.

Differs from *L. myrrha* in being somewhat smaller, the fore wings less falcated below the apex, the upperside having the discoidal streak and continuous spot very narrow, and the two sets of subapical spots widely separated and ferruginous white; the streak on the hind wing very narrow, short, and placed in the middle of the wing.

Expanse 1⅞ inch.

Hab. Ceylon. In Coll. Capt. Hutchison and F. Moore.

Subfam. Nymphalinæ.

Genus Cethosia, Fabr.

Cethosia mahratta.

Papilio cyane, Cram. Pap. Exot. iv. pl. 295. f. C, D. (*nec* Drury).

Male. Upperside bright fulvous red: fore wing with the apical half, transverse discoidal streaks, and spots between the lower veins black; a broad subapical oblique white band, crossed on its lower part by two black spots which form part of a transverse discal series, the two upper and lower ones of which are conical and inwardly ringed with white; beyond these is a submarginal row of small white spots and a marginal series of white angles: hind wing with the anterior and exterior margins black, the latter with a series of white angles; three transverse discal series of black spots, the inner series small and irregularly disposed, the outer row oval, each ringed with white and bordered outwardly by a black lunule. Underside fulvous red basally, fulvous yellow exteriorly; exterior margins with black-bordered, clearly defined, white angles, each angle having a white streak pointing inwards: fore wing with the oblique subapical white band and transverse discal series of oval white-ringed black spots as above, with a parallel outer row of white-bordered black lunules; transverse discoidal and discocellular streaks, small basal spots, three small spots beyond the cell, and spots between the veins below the cell black, the latter series interspaced with pale bluish green: hind wing with subbasal transverse black streaks, three discal rows of black spots, the outer row of spots conical and broadly white-bordered, and having each a contiguous

outer small black lunule; interspaces of subbasal streaks and inner discal rows of spots pale bluish green.

Female with markings as in male, but blacker and more prominent, the hind wing on the upperside having the black borders broader, the discal series of black oval spots larger and partly confluent with the inner series, the outer black lunules being bordered with a mixed white and fulvous lunule; head and thorax fulvous brown; abdomen fulvous.

Expanse, ♂ $2\frac{3}{4}$, ♀ $3\frac{1}{2}$ inches.

Hab. Malabar, S. India. In Coll. F. Moore.

Nearest allied to *C. nietneri*, Felder, Voy. Novara, pl. 48. f. 5, 6.

Genus Cirrochroa, Doubleday.

Cirrochroa thais.

Papilio thais, Fabr. Mant. Ins. p. 64 (1787); Ent. Syst. iii. p. 149.

Cirrochroa thais, Butler, Catal. Fabr. Lep. Brit. Mus. p. 116 (1869).

Male and *female*. Upperside pale ferruginous, glossed with green at the base: fore wing with a prominent medial transverse black line, which is oblique and zigzag in front of the cell and lunular hindward; exterior margin broadly dusky black and traversed by a double row of ferruginous lunules, the marginal row obsolete at the apex; a dusky streak lining the discocellular vein: hind wing with a large round white spot on anterior margin, from which proceeds the medial transverse black lunular line, between which and the exterior margin is a parallel row of six small black spots, two dusky lunular lines and a third outer line. Underside pale ferruginous brown in male, brown in female, with a transverse medial irregularly dentated purple-white glossy band on both wings, the outer margin of the band being straight, and the dentations disappearing towards anal angle of hind wing; transverse row of black spots on hind wing smaller than on upperside, marginal dusky lunules hardly visible.

Expanse $2\frac{1}{4}$ inches.

Hab. Ceylon; S. India. In Coll. British Museum and F. Moore.

Note.—The above is the description of the insect which, according to Mr. Butler's determination, is the *C. thais* of Fabricius.

Cirrochroa lanka.

Male. Upperside bright ferruginous: fore wing with medial transverse black line, which is oblique in front of the cell, nearly obsolete hindward; marginal band black, traversed by an inner row of ferruginous lunules, the outer series being more or less obsolete: hind wing with the white spot on the anterior margin large, the median transverse line from it faintly defined; the parallel row of black spots, outer and second marginal lines prominent. Underside dusky ferruginous, somewhat fulvous at the base, glossed with purple-grey; a broad transverse medial prominent purple-white

glossy band; indistinct lunules on outer margin of wings with purple-grey borders; black spots on hind wing prominent.

Expanse $2\frac{1}{2}$ inches.

Hab. Ceylon and S. India. In Coll. F. Moore.

CIRROCHROA MITHILA.

Male. Upperside pale ferruginous: fore wings with the blackish marginal band narrow, its inner row of lunules palely defined; medial transverse line scarcely visible on either wing; the row of black spots, white spot on anterior margin, and outer marginal lunular lines of hind wing also very palely defined. Underside dull testaceous, glossed with greyish purple; medial band obsolete, its place faintly defined by a dusky straight outer streak and narrow inner line; spots on hind wing partly obsolete.

Expanse $1\frac{3}{8}$ inch.

Hab. Bengal. In Coll. F. Moore.

Genus CYNTHIA, Fabr.

CYNTHIA ASELA.

Male. Upperside golden yellow, palest across the disk: fore wing with dusky black discoidal streaks, medial transverse irregular line, and two marginal zigzag lines; parallel to the inner marginal line is a row of ill-defined small black spots, the apical spot being pale-centred: hind wing with dusky black transverse medial line, two marginal lunular lines, and two submarginal white-centred ocelli. Underside uniform yellow outward from medial dusky line, the base suffused with ochry red; basal streaks bright red: fore wing with three contiguous apical white spots, inner marginal straight pale dusky red line, almost obsolete outer marginal zigzag line; a discal transverse zigzag line on both wings; marginal lunular lines and extreme margin of hind wing from tail to anal angle chestnut-brown; a transverse streak passing the ocelli on hind wing.

Female. Upperside greyish blue, this colour pervading the wings to beyond the medial band, the margin being blackish brown; medial white band on hind wing terminating at second subcostal vein. Underside similar to *C. erota*.

Expanse, ♂ $3\frac{1}{2}$, ♀ 4 inches.

Hab. Ceylon. In Coll. British Museum and F. Moore.

Genus SYMBRENTHIA, Hübn.

SYMBRENTHIA BRABIRA.

Male. Upperside black, with very broad irregular-margined orange-red bands, disposed as in *S. hypselis*. Underside deep yellow: fore wing imperfectly tessellated with black at the base, below and at the apex, and on the middle: hind wing tessellated at the base and on abdominal margin; the submarginal band formed

of narrow lunular lines; a marginal series of narrow lunules, of which the third from the angle is metallic green.

Expanse 1¾ inch.

Hab. N. India. In Coll. F. Moore.

SYMBRENTHIA NIPHANDA.

Male and *female*. Upperside dark fuliginous brown: fore wing with a testaceous elongated discoidal streak, an oblique subapical irregular streak, a small apical lunule, a broad band extending obliquely from near posterior angle to abdominal margin of the hind wing, below which band is a submarginal lunular band. Underside pale testaceous yellow: fore wing tessellated with black along base of costa, at the apex, obliquely from middle of outer margin, and across the base of the hind wing, broadly from lower part of abdominal margin, and then decreasing upward towards the angle, beneath which is a series of broad metallic-green lunules with black double borders; outside these is a marginal band, the middle portion being metallic green. The spaces representing the streaks and bands of the upperside are very pale and glossy on the underside.

Expanse, ♂ 1⅗, ♀ 2¼ inches.

Hab. Sikkim Himalayas. In Coll. F. Moore.

Genus VANESSA, Fab.

VANESSA RIZANA.

Male. Differs from *V. cashmirensis* in being a smaller and more compact insect, and having the fore wing less produced at the apex; markings and colours disposed as in that species, but more clearly defined and the colours much brighter: fore wing with the red colour near the base descending to near the submedian vein, the posterior black spot being quadrate, well defined, and broadly bordered outward with clear yellow, this colour also bordering the two upper discal spots; submarginal black border narrow: hind wing with the black base bordered outwardly by clear yellow; the submarginal row of dentate blue-centred black lunules being without the broad inner dusky border. Underside darker than in *V. cashmirensis*; markings similar.

Expanse 1⅘ inch.

Hab. Cheeni (9000 feet), Middle Kunawur, N.W. Himalaya (*Capt. Beckett*). In Coll. F. Moore.

Genus GRAPTA, Kirby.

GRAPTA AGNICULA.

Male and *female*. Upperside bright fulvous red; both wings with prominent black markings disposed as in Cashmere specimens of *G. c-album*, excepting that in the fore wing the basal spot within the cell is here broken up into two well-separated spots, and the marginal band in the male is nearly obsolete at the apex. Female with a broader marginal blackish-grey band, the band on the fore wing bordered by an inner row of yellowish spots, and that on the hind

wing by a medial row of yellow spots. Underside very dark greyish brown, brownest at the base within the irregular medial transverse line, and covered with minute black strigæ; a transverse discal row of hardly perceptible small black spots with pale borders; a white comma-like mark on hind wing.

Expanse $2\frac{1}{8}$ inches.

Hab. Katmandu, Nepal; Goolmurg, N.E. of Cashmere. In Coll. Capt. A. M. Lang and F. Moore.

Genus Lebadea, Felder.

Lebadea austenia. (Plate XXXII. fig. 1.)

Male. Upperside dark chocolate-brown, with purple reflections: both wings crossed by a pale lunular band, extending from the costa of fore wing beyond the cell to hind wing above the anal angle; exterior to this is a transverse series of pale-bordered dark brown lunules, those on the fore wing being most prominent and zigzag from the costa, where they are white-bordered, and thence decreasing on to the hind wing; space outside these to exterior margin pale brown with a dark brown submarginal and marginal line; cell of fore wing crossed by six and that of hind wing by four black streaks; cilia white. Underside greyish brown, whitish grey at base; marked as above, but having the outer band with all the lunules white-bordered, except the two lower ones on both wings, which are nearly black. Palpi, legs, and body beneath greyish white.

Expanse 3 inches.

Hab. Khasia Hills (*Major H. H. Godwin-Austen*). In Coll. F. Moore and India Museum, Calcutta.

Genus Neptis, Fabr.

Aceris group.

Neptis astola.

Allied to, but differs from *N. aceris* of Europe in having the wings shorter and broader, the markings on the upperside more prominent, and those on the underside more clearly defined by a black border, by which they are all margined.

Expanse, ♂ $1\frac{5}{8}$, ♀ $1\frac{7}{8}$ inch.

Hab. N.W. Himalayas (Simla, Masuri). In Coll. F. Moore.

Neptis mahendra. (Plate XXXII. fig. 3.)

Male and *female.* Upperside black: wings elongated, as in the European *N. aceris*; markings white, and disposed as in that species, but more prominent and broader than in any other known allied species of this group, being broader even than in *N. nandina.* Underside deep brownish ferruginous: markings white, broad, their borders imperceptibly black-margined, not prominently so as in *N. astola* or *N. varmona*: middle band of hind wing narrowing to abdominal margin.

Expanse, ♂ 2, ♀ $2\frac{1}{2}$ inches.

Hab. N.W. Himalaya (Simla, Masuri). In Coll. Capt. A. M. Lang and F. Moore.

NEPTIS VARMONA.

Has much the appearance of the European *N. asceris* in the more elongated form of the wings and in the less defined markings of the upperside, which, in the male, are more like those of the European species than in *N. astola*. The colour of the underside is duller and more yellow, and the black borders of the markings are still more prominent than in *N. astola*, the veins of the fore wing being streaked with black in front of the triangular discoidal spot.

Expanse $1\frac{3}{4}$ to 2 inches.

Hab. Mountains of S. India (Matheran; Neilgherries). In Coll. F. Moore.

NEPTIS EMODES. (Plate XXXII. fig. 2.)

Male and *female*. Upperside blackish fuliginous; markings disposed as in *N. astola*, but smaller, narrower, and of a brownish white colour. Underside bright dark ferruginous red; markings very prominent and black-bordered.

Expanse, ♂ 2, ♀ $2\frac{3}{8}$ inches.

Hab. S.E. Himalayas (Nepal, Sikkim, Khasia Hills). In Coll. F. Moore.

NEPTIS LEUCOTHOË.

Papilio leucothoë, Cram. Pap. Exot. iv. pl. 296. figs. E, F (1792)
Acca matuta, Hübner, Verz. bek. Schmett. p. 44.

This species may be readily distinguished from *N. surakarta* by the outer marginal row of spots on the fore wing being small or nearly obsolete, and the outer lunular band on the hind wing being very narrow, and suffused with brown.

Expanse 2 to $2\frac{1}{4}$ inches.

Hab. Java, Borneo. In Coll. F. Moore.

Note.—Cramer gives "Java, China, and Coromandel" as the habitats of his *P. leucothoë*; specimens from Java only, however, are identical with his figure, those from China and Coromandel being quite distinct species.

NEPTIS SURAKARTA.

A large broad-winged species, similar to *N. leucothoë* of Cramer, but with the markings of the upperside in both sexes broader, larger, and of a yellowish-white colour; the lunular spots of the outer bands are also broader than in that species. Underside bright ferruginous red.

Expanse 2 to $2\frac{1}{4}$ inches.

Hab. Java. Coll. F. Moore.

Columella group.

NEPTIS OPHIANA.

Male. Upperside dark fuliginous black, markings white: fore

wing with very narrow terminally-indented discoidal streak, and large broad triangular spot beyond; a curved discal transverse series of five spots, the two upper obliquely before the apex, the next pair on the middle of the disk, the lower one of which points to the angle of the wing, the fifth elongated and extending along posterior margin; a submarginal interrupted row of whitish lunules with black borders: hind wing with broad inner band, and a less prominent submarginal series of six rather quadrate spots. Underside brownish-ferruginous, markings as above, white, prominent: fore wing with three marginal series of lunules: hind wing with bluish-white basal streak, subbasal fascia, a narrow transverse median discal and a marginal lunular bluish-white line; median band terminating on third subcostal vein.

Expanse $2\frac{1}{2}$ inches.

Hab. Sikkim. In Coll. F. Moore.

Allied to *N. columella*, Cram.

Group ——?

NEPTIS KHASIANA. (Plate XXXII. fig. 7.)

Male. Upperside dark fuliginous black: fore wing with an elongated bluish-white narrow discoidal streak, and small terminal contiguous spot, two oblique subapical spots, and a row of four spots to middle of hind margin; an indistinct submarginal row of very small spots, each side of which has a pale wavy line: hind wing with a narrow subbasal bluish-white band, and a submarginal row of five small spots: cilia alternated with white. Underside dark brown; markings as above, but more prominently bluish white: hind wings with a white band along base of anterior margin, and a pale median and marginal lunular line.

Expanse $2\frac{1}{4}$ inches.

Hab. Khasia Hills (*Major Godwin-Austen*). In Coll. F. Moore.

Vikasi group.

NEPTIS CARTICA.

Male and *female.* Upperside dark fuliginous black: fore wing with long fuliginous-white discoidal streak, indented at the end of the cell, beyond which is a maculated band curving from costa before the apex to middle of hind margin, and bordered outwardly by a narrow wavy line and a submarginal row of whitish lunules, the marginal line being black: hind wing with straight inner whitish band and less distinct outer submarginal band, between which is a pale brown line, and a similar line along outer margin. Underside dark ferruginous, banded as above, the marginal lines on fore wing more prominent, and tinged with purple, the median discal line and marginal line on hind wing also purple-tinged; base of hind wing with a broad white streak.

Expanse ♂ $2\frac{4}{5}$, ♀ $2\frac{6}{8}$ inches.

Hab. Nepal (*General Ramsay*). In Coll. F. Moore.

Allied to *N. amba*, specimens of which, from the same locality, are under examination.

NEPTIS CLINIA. (Plate XXXII. fig. 5.)

Male. Upperside black; markings white: fore wing with a rather broad discoidal and short contiguous streak; curved discal band of broad closely united spots; marginal black-bordered lunular line indistinct: hind wing with a very broad straight inner band and narrow brownish-white outer lunular line. Underside bright ferruginous, markings as in *N. soma*, but very prominent.

Expanse 2 inches.

Hab. Bengal. In Coll. F. Moore.

NEPTIS ADIPALA. (Plate XXXII. fig. 8.)

Male. Upperside fuliginous black; markings white: fore wing with a narrow discoidal and elongated triangular contiguous streak; spots of curved discal band small; a submarginal row of black-bordered lunules: hind wing with moderately broad inner band, and outer band of narrow quadrate spots. Underside deep bright ferruginous: fore-wing markings as above: hind wing with the bands and two basal streaks similar to those of *N. nandina*, except that the narrow outer line is in this nearer the margin.

Expanse 2 inches.

Hab. Khasia Hills (*Major Godwin-Austen*). In Coll. F. Moore.

NEPTIS SUSRUTA. (Plate XXXII. fig. 4.)

Male. Upperside brownish black: fore wing with ferruginous white narrow discoidal and attenuated contiguous streak; curved discal band of small and widely separated spots, an ill-defined black-bordered submarginal lunular line: hind wing with white inner band, and ferruginous white outer narrow lunular curved band. Underside deep ferruginous; markings prominent, and suffused with pale ferruginous; those of the hind wing similar to *N. soma*, but narrower.

Expanse 2 inches.

Hab. N. India. In Coll. F. Moore.

Zaida group.

NEPTIS VIRAJA. (Plate XXXII. fig. 6.)

Male and *female*. Upperside black; markings ferruginous: fore wing with a broad discoidal streak extending to two thirds the length of the wing; a large broad subapical oblique spot, and a broad band beneath extending to hind margin; an indistinct pale brown marginal line: hind wing with a broad transverse inner band and narrow submarginal band. Underside ferruginous brown in male, blackish ferruginous in female; markings as above, pale glossy ferruginous white, and tinted with blue in some lights; a marginal line on both wings; a narrow median discal line, basal and a subbasal streak on hind wing bluish white.

Expanse, ♂ $2\frac{1}{8}$, ♀ $2\frac{4}{8}$ inches.
Hab. N.E. Bengal. In Coll. F. Moore.
Allied to *N. radha*.

Genus Athyma, Westw.

Athyma zeroca.

Male. Upperside velvety blackish brown; a broad median bluish-white band crossing from middle of fore wing to abdominal fold of hind wing: fore wing with two, and in some specimens three, subapical oblique white spots; both wings with a pale brown-bordered blackish marginal line. Underside brownish ferruginous; bluish-white median band and subapical spots as above: fore wing with a straight bluish-white discoidal streak, contiguous dentate spot, and marginal lunular lines; a blackish spot near base of hind margin: hind wing with a subbasal bluish-white streak, a submarginal and a paler marginal line; abdominal margin bluish grey; between the median band on both wings and submarginal line is a blackish maculated fascia.

Expanse 2 inches.
Hab. Khasia Hills (*Major Godwin-Austen*). In Coll. F. Moore.
Allied to *A. selenophora*.

Subfam. Pierinæ.

Genus Metaporia, Butler.

Metaporia caphusa.

Male. Upperside brownish black (female brown): fore and hind wings with greyish-white streaks between all the veins, those on the disk being medianly divided anteriorly and partially so to the hind margin, thus forming two series. Underside vinous brown; streaks as above, those of the female being yellowish on the hind wing, which has also a bright yellow basal spot.

Expanse, ♂ $2\frac{3}{4}$, ♀ $3\frac{1}{2}$ inches.
Hab. N.W. Himalayas (Masuri, Simla, Kunawur). In Coll. F. Moore.

Allied to *M. phryxe*, Boisd., but differs in being darker, the white markings forming only narrow streaks between the veins, and terminating some distance from the outer margins; the costal margin is also black.

Metaporia ariaca.

Male. Allied to *M. agathon*, Gray, and the preceding, and may be distinguished from the latter by its being much blacker in colour, the white streaks still narrower, smaller, well defined, and more prominent, the transverse series having a wide interspace between them, the streak within the cell and base of posterior streak of the fore wing being dusky black.

Expanse 3 inches.
Hab. Himalayas (Nynee Tal district). In Coll. F. Moore.

Genus Eronia, Hübn.

Eronia pingasa.

Male. Upperside fuliginous brown: fore wing with a basally divided streak within the cell, short spaces between the veins beneath it, and a narrow streak between the two subcostal veins pale blue, these streaks extending only to the middle of the disk: hind wing with the spaces between the veins from the base to near middle of the disk pale blue. Underside paler fuliginous brown, the markings pale glossy blue, but less prominent than above, there being also a marginal series of pale bluish rounded spots.

Expanse $2\frac{3}{4}$ inches.

Hab. Canara, S. India. In Coll. F. Moore.

Genus Pieris.

Pieris vipasa.

Female. Upperside white: fore wing with a large quadrate discal black spot, which is crossed by the discocellular vein; a black apical patch with four marginal white spots; a small indistinct dusky spot near posterior angle: hind wing with an ill-defined blackish anterior marginal spot, below which are two white-centred black apical spots, the black of which, however, does not unite on the outer margin; beyond is a small indistinct blackish marginal spot. Underside: fore wing with greyish-brown markings as above: hind wing with the veins throughout and the base of anterior margin orange-yellow; greyish-brown markings disposed as in *P. daplidice*, but with the white intervening parts broader.

Expanse $1\frac{7}{10}$ inch.

Hab. Derajat, Punjaub; N.W. India. In Coll. F. Moore.

Allied to *P. daplidice*, specimens of which, both European and from the N.W. Himalayas, are before me.

Pieris taprobana.

Male. Upperside white: fore wing with a broad black marginal band extending from one third before the apex to posterior angle, the inner border being irregular and having two or three small white apical streaks; base of costa dusky black, discocellular streak black: hind wing with a broad marginal black band, with indistinct white spots; a black lunule and a spot before the apex.

Female. Upperside as in male, with the black marginal and costal bands broader, the discocellular streak joining the band by the black extending along the veins and forming three oval white spots, Underside with the bands as above, blackish brown or dark vinous brown, this colour also extending along the veins on the hind wing, the intervening spaces and a series of submarginal triangular spots on this wing and the apical streaks on fore wing being bright orange-yellow; base of fore wing also suffused with yellow.

Expanse 2 inches.

Hab. Ceylon. In Coll. Capt. Hutchison and F. Moore.

Allied to *P. mesentina*, of which it is the Ceylon representative.

Genus THYCA, Wallengren.

THYCA DEVACA.

Female. Upperside fuliginous brown: fore wing with indistinct whitish streaks in the cell and between the veins, the latter terminating in a band of elongated spots across the apex: hind wing with a broader whitish streak between the veins, the anterior margin and the space within the cell being tinged with pink; the streaks terminating in a submarginal series of indistinct maroon-brown spots; abdominal margin broadly buff-white. Underside: fore wing as above, the markings well defined and white, the three upper apical spots yellow: hind wing with all the veins and outer margin dark brown; the entire space between the costal and subcostal veins, as well as that of the discoidal cell, brick-red; a submarginal series of bright blood-red spots; base of wing, abdominal margin, and space between the veins to the subcostal bright yellow inward and white outward.

Expanse 3 inches.

Hab. Burmah. In Coll. F. Moore.

Allied to *T. hierte*, Hübn., a Burmese female of which is before me, but from which it may be at once distinguished by the prominent brick-red colour at the base of the hind wing.

THYCA BERINDA.

Female. Upperside dark fuliginous: fore wing with a marginal and discal transverse series of elongated indistinct whitish streaks, and a parallel streak near the end of the discoidal cell: hind wing with a bright yellow basal spot, a double series of pale yellowish-white indistinct streaks and a more prominent elongated streak within the cell; abdominal margin vinous-grey. Underside vinous-brown, marked as above, but more prominently; all the markings of the hind wing and three apical spots on fore wing bright yellow; abdominal margin entirely vinous-brown.

Expanse 3½ inches.

Hab. Khasia Hills (*Godwin-Austen*). In Coll. F. Moore.

Allied to the Nepalese *T. horsfieldi*, but differs from the same sex of that species in having the wings more elongated, the hind wing being considerably produced anteriorly.

Genus TERIAS, Swains.

TERIAS RAMA.

Female. Shape of wings as in *T. venata*. Pale yellow, thickly speckled with dusky scales, especially at base of fore wings: a broad brownish-black border on the fore wing, as in *T. venata*: hind wing with a broad brownish-black apical border which is suffused to the middle angle and extends along the marginal line: cilia of fore wing pale brown, of hind wing pale yellow. Underside paler, speckled with dusky scales; two transverse indistinct bands on hind wing, composed of dusky scales.

Expanse 1½ inch.

Hab. Colombo, Ceylon. In Coll. Capt. Hutchison and F. Moore.

Tribe SPHINGES.

Genus PERGESA, Walker.

PERGESA OLIVACEA.

Male and *female* olive-green: fore wing with three subbasal and three discal transverse zigzag lines, the former dusky brown, the latter ferruginous; a prominent discocellular blackish spot with white centre; a suffused chalybeous zigzag-bordered band along exterior margin: hind wing ferruginous black, with a submarginal ferruginous zigzag band: cilia at anal angle white, the rest ferruginous: a narrow white lateral fringe to thorax; abdomen laterally above, wholly beneath, and the underside of both wings yellowish testaceous: discal transverse lines beneath and marginal bands to both wings dark brown, the inner line on fore wing broad and extending along the cell.

Expanse $2\frac{3}{4}$ inches.

Hab. Simla, N.W. Himalayas, 7000 feet. In Coll. Capt. Lang and F. Moore.

PERGESA CASTANEA.

Male. Fore wing dark chestnut-brown, with two indistinct subbasal oblique fasciæ of paler brown, the outer fascia encircling a small black discocellular spot; outer margin of the wing broadly chalybeous-speckled; base of hind margin fringed with greyish brown hairs: hind wing dark cinnamon-brown: cilia of both wings chestnut-brown, and white at the angles: head, thorax, and upper part of abdomen dark chestnut-brown, sides of latter pale cinnamon-brown; thorax with a white lateral line. Underside bright ferruginous brown, with three transverse lunular greyish lines, and greyish-speckled outer margins: legs pale brown: antennæ brown.

Expanse, ♂ $2\frac{1}{2}$ inches.

Hab. Bombay. In Coll. F. Moore and Dublin Nat. Hist. Society.

Genus nov. LANGIA.

Palpi short, thick, densely pilose. Antennæ minutely pectinated. Legs thick, rather short; tibiæ incrassated at the apex; femora of all the legs and fore tibiæ densely pilose, middle and hind tibiæ squamose; middle tibiæ armed with one pair and hind tibæ with two pairs of contiguous straight sharp spurs. Body robust, thorax broad, abdomen extending half its length beyond the hind wings. Fore wings long, narrow, exterior margin deeply scalloped, costa arched near the apex. Hind wings moderate, slightly scalloped.

LANGIA ZENZEROIDES.

Male mottled grey and brown: fore wing thickly speckled with black and testaceous scales; costa broadly grey, the hind and exterior margins brownish grey, the median space from base to apex whitish testaceous; from the hind margin proceed three blackish

lines which terminate irregularly on the costa before the apex, the middle line being indistinct; a short white exterior submarginal line from posterior angle, and an extreme marginal blackish lunular line with pale inner border: hind wing clear brown from the base, grey along exterior margin, along which is a black lunular line; from the anal angle proceed a short narrow white line and upper black streaks, the space above which is pale and speckled with black: head and thorax grey, with brown median longitudinal streaks and a well-defined black lateral streak; base of thorax densely tufted with black and brown spatulated scales; abdomen and legs greyish black.

Expanse 5¼ inches.

Hab. Kotghur (50 miles from Simla), N.W. Himalayas. In Coll. Capt. A. M. Lang.

LANGIA KHASIANA.

Male. Fore wing with the exterior margin deeply festooned; pale testaceous; a broad dark grey costal band extending to near the tip; two black submarginal contiguous bands, the outer one broadest and the inner nearly obsolete on the hind margin; a parallel black discal band which is bifid on the hind margin and there forms an elongated loop, being anteriorly nearly obsolete; between this and the inner submarginal band runs a parallel paler and much less distinct band; and below the grey costa extends a black streak; interspaces of the entire wing from the costa black-speckled, which are most numerous about the looped band, the costa being speckled with testaceous: hind wing brown, greyish along anterior margin and testaceous at anal angle; from the latter extends a short submarginal black streak which is broadest at the angle: exterior margins of both wings with black lunules, each having a grey inner border: head and thorax grey; thorax with narrow longitudinal testaceous median streaks and a broad lateral testaceous-bordered black streak; abdomen brown, speckled with testaceous; legs greyish brown above, tarsi nearly white, all the joints black-tipped; shaft of antennæ blackish grey, pectinations pale testaceous; eyes brown; tips of palpi black, fringed with white, and having each a white-ringed dot in front.

Expanse 5¾ inches.

Hab. Khasia Hills (*Major H. H. Godwin-Austen*). In Coll. F. Moore.

Genus SMERINTHUS.

SMERINTHUS DECORATUS.

Female dark olive-brown, suffused with pale pink: fore wing with a large median costal dark brown patch bordered with pale pink and partly enclosing a pale brown reniform discal spot, beneath which is a smaller lobe-shaped darker brown patch; near the apex is a triangular grey patch bordered with dark brown, below which is a short longitudinal diaphanous white streak; between the costal patches are two transverse recurved pale pink lines, the outer one

irregularly bordered externally near the posterior angle with suffused brown streaks: hind wing with a broad black and a narrow pale pink streak from anal angle: abdomen with a dark narrow dorsal line.

Expanse $2\frac{7}{8}$ inches.

Hab. Sikkim. In Coll. Capt. A. M. Lang.

Tribe BOMBYCES.

Subfam. AGARISTINÆ.

Genus EUSEMIA, Dalm.

EUSEMIA FUNEBRIS.

Male black: fore wing indistinctly irrorated wtih greyish-blue scales, these being disposed in groups along the exterior and posterior borders; within the discoidal cell is a small white subbasal dot and a large transverse spot, and outside the discocellular vein is a small upper and a geminated lower spot; cilia above and below the apex with a white spot: hind wing with a broad subbasal, partly transverse, white band, with scalloped outer margin and an ill-defined or partly obsolete series of submarginal white spots: antennæ, head, thorax, palpi, and legs black, the four latter interspersed with white scales: abdomen black, with red bands and anal tuft, and a white waist-band. Underside as above, with the white spots more defined, the hind wing having an additional basal costal spot.

Expanse $2\frac{1}{2}$ inches.

Hab. Darjiling. In Coll. F. Moore and W. W. Saunders.

EUSEMIA ALBOMARGINATA.

Male and *female* velvety black, with white exterior margins: fore wings with the veins blue-black, an elongated discocellular and a smaller central discoidal steel-blue impressed mark: both wings with the inner margins of the white exterior borders lunular, the black veins extending to nearly the extreme outer margin; cilia white: hind wings with blue reflections. Underside as above, with a light yellow twice-divided central discoidal spot. Body black; a narrow white collar round front of thorax; palpi black, second joint fringed with yellow at the sides; chest and front legs orange-yellow; tarsi and femur black above; middle and hind legs black above, yellow beneath; antennæ black.

Expanse, ♂ $2\frac{1}{2}$, ♀ 3 inches.

Hab. Burmah. In Coll. F. Moore and Dublin Natural-History Society.

Subfam. CHALCOSINÆ.

Genus MILIONIA, Walk.

MILIONIA ZONEA.

Male black, with purplish blue reflections; median and sub-median veins at base of both fore and hind wings smalt-blue; a broad golden-yellow median band across the fore wing; also a broad ex-

terior band of the same colour on the hind wing, which has a marginal series of five black oval disconnected spots: body and legs smalt-blue; antennæ black, slightly setose; anal tuft with some pale yellow hairs.

Expanse $2\frac{5}{8}$ inches.

Hab. N.E. Bengal (*Capt. Sherwill*). In Coll. F. Moore.

MILIONIA LATIVITTA.

Male black; median and submedian veins at base of fore and hind wings smalt-blue; a broad orange-yellow oblique median band across the fore wing: body and legs blue; antennæ slightly setose, brown.

Expanse $2\frac{3}{8}$ inches.

Hab. Sikkim. In Coll. F. Moore.

Allied to *M. glauca*, Cram. Pap. Exot. pl. 368. f. D, from Amboina.

Genus CHELURA, Hope.

CHELURA GLACIALIS.

Male and female whitish hyaline, glossy: fore wing with a dark yellowish-brown band at the base, and a broad tortuous fuliginous-brown transverse median band; the veins at the apex and exterior border margined with fuliginous: hind wing with a costal and a discocellular spot, and exterior border fuliginous brown: head, thorax, and legs yellowish brown; abdomen blackish, with a grey waist-band and lateral streak; antennæ black, bipectinate.

Expanse 2 to $2\frac{1}{4}$ inches.

Hab. Darjiling. In Coll. W. W. Saunders and F. Moore.

Subfam. HYPSINÆ.

Genus NEOCHERA, Hübn.

NEOCHERA TORTUOSA. (Plate XXXIII. fig. 2.)

Female. Fore wing greyish fuliginous; base yellow, with several black spots; a white irregular-margined tortuous inwardly oblique band extending from near the costa to the hinder part of the base, above which is a small costal white spot: hind wing white, with a fuliginous-black anterior marginal line, an exterior marginal row of eight spots, of which those at the angles are the largest, two similar spots from anal angle, a single submarginal spot, and two discoidal spots, the basal one being small and indistinct. Underside white: fore wing with the costa, two discoidal spots, apex, exterior margin, and narrow submarginal maculated band fuliginous black: hind wing as above, with the addition of a small third discoidal and a large costal spot. Palpi and front of head black; thorax and abdomen yellow; thorax with black spots; tegulæ with a longitudinal black streak: abdomen with a dorsal, lateral, and two rows beneath of black spots: antennæ brown; legs fuliginous.

Expanse $2\frac{3}{4}$ inches.

Hab. India. In Coll. W. W. Saunders, Esq.

Genus nov. CALPENIA.

Female. Fore wing elongate, broad at the apex; exterior margin oblique, nearly straight; apex and posterior angle acute; posterior margin three-fourths the length of the costa. Submedian vein with the first branch starting at one fourth from end of the cell and ascending to costa at one fourth from the apex, second branch arising from end of the cell and running parallel with the first to the costa, and sending forth three forks, two to the costa, the other to below the apex; a sixth vein starting from the discocellular vein near the juncture of the second submedian veinlet. Hind wing broad; apex rounded, extending beyond the angle of fore wing; exterior margin slightly angled in the middle. Palpi suberect, slender; second joint rather long; third joint short, conical. Antennæ minutely setose. Body robust, broad. Proboscis short. Legs rather slender, squamose; tibiæ armed with spurs.

CALPENIA SAUNDERSI. (Plate XXXIII. fig. 1.)

Female. Fore wing bluish fuliginous; veins conspicuous; extreme marginal line darker, without gloss, and having five bluish-white, nearly equidistant, outwardly curved, transverse maculated bands, the first of which encloses a small basal yellow spot, the second consisting of six small spots, the third of broad and large spots, the other two being composed of small spots: hind wing bluish white basally, bluish black on exterior half, on which are two marginal series of bluish-white spots. Underside as above: veins conspicuous; the maculated bands more defined, and those on the fore wing confluent basally. Palpi above and antennæ black: head, thorax, and abdomen bright yellow with black spots, those of the thorax longitudinal; the abdomen having a dorsal, two lateral, and one row beneath of square spots, besides five longitudinal streaks on the anal segment above: tegulæ with a white spot; legs fuliginous.

Expanse $3\frac{1}{2}$ inches.

Hab. India. In Coll. W. W. Saunders, Esq.

Genus AGRISIUS, Walker.

AGRISIUS FULIGINOSUS. (Plate XXXIII. fig. 3.)

Female pale greyish fuliginous; the veins exteriorly defined by darker fuliginous lines: fore wing with twelve small black spots at the base, and a recurved linear series of six spots from middle of hind margin to upper end of discoidal cell; above this and more towards the base of the wing are two other spots on the costa: head and thorax with black spots: abdomen above with a narrow dorsal, a broad quadrate outer row, and then a very narrow lateral row of black spots, there being also two broad rows beneath: palpi and antennæ black: fore and middle legs black above, grey beneath; hind pair with the tibiæ and tarsi black beneath.

Expanse $2\frac{3}{4}$ inches.

Hab. India. In Coll. W. W. Saunders, Esq.

Subfam. Lithosiinæ.

Genus Lithosia, Fabr.

Lithosia distorta.

Male and *female*. Fore wing pale testaceous yellow, suffused in parts with fuliginous brown, yellowish along the costa; a blackish spot on the costa one-third from the apex: hind wing much paler: fore wing of the male with a longitudinal depression or fold along the cell, the subcostal vein being fringed with overlapping broad adpressed scales; apex of the wing distorted, and wrinkled to the extreme margin; hind margin very convex: third joint of palpi and front of head brown: proboscis, top of head, anal tuft, and antennæ yellow; legs brown above, yellowish beneath; thorax brown; abdomen greyish brown; eyes black.

Expanse, ♂ $1\frac{4}{10}$, ♀ $1\frac{5}{10}$ inch.

Hab. Sikkim. In Coll. W. W. Saunders, Capt. Lang, F. Moore.

Lithosia nigrifrons.

Male. Fore wing narrow, convex towards base of posterior margin; a longitudinal depression from base to posterior angle, pale pinkish cream-colour; apex and cilia tinged with pale golden-yellow: hind wing slightly paler cream-colour, yellowish exteriorly: front of head blackish brown; top of head, thorax, and abdomen pale golden yellow: legs entirely blackish above; femur and tibia yellowish beneath: third joint of palpi black: eyes jet-black; antennæ setose, brown; wings beneath yellow, fore wing tinged with brown.

Expanse $1\frac{5}{12}$ inch.

Hab. N. India. In Coll. F. Moore.

Genus Bizone, Walker.

Bizone gazella. (Plate XXXIII. fig. 4.)

Male and *female* white: fore wing with several transverse tortuous cinnamon-yellow bands, which in the male are confluent and thus form a series of nine white spots, four of which are costal, three on the hind margin (from the last of which ascends an upper streak), the other two spots being below the third and fourth costal: cilia white: thorax with cinnamon-yellow bands; fore and middle tibiæ with black streaks; tarsi black; palpi black, fringed beneath with white; antennæ brown.

Expanse, ♂ $1\frac{4}{10}$, ♀ $1\frac{8}{10}$ inch.

Hab. Masuri, N.W. Himalaya. In Coll. Capt. A. M. Lang and W. W. Saunders.

Subfam. Arctiinæ.

Genus Aloa, Walker.

Aloa nigricans.

Fore wing dark blackish brown: hind wing brick-red; a blackish-brown band on anterior margin and three large connected spots on exterior margin: thorax above, entire body beneath, and

legs blackish brown; femora red above; abdomen red above, with a dorsal and lateral row of blackish spots; tegulæ and a narrow band on front of thorax and head pale testaceous; a black spot on each tegula. Underside of wings as above.

Expanse $1\frac{3}{8}$ inch.

Hab. Bombay (*Dr. Leith*); Deccan (*Dr. Day*). In Coll. F. Moore.

ALOA SIPAHI.

Male and *female*. Fore wing brown, with numerous more or less confluent reddish-white spots from the base, and extending along the disk to near the apex, above which and proceeding from the costa are two or three sets of three inwardly oblique confluent spots; a row of small spots along exterior margin: hind wing brick-red, with three blackish-brown spots on anterior margin and a lengthened similar spot from anal angle, the latter in some specimens joining the outer anterior spot: thorax brown; head, front of thorax, and tegulæ white; two black spots on front of thorax, one on each tegula, and another on the extreme base of the fore wing; abdomen red, with a dorsal and lateral row of blackish spots; antennæ blackish; legs brown, femora reddish above.

Expanse, ♂ $1\frac{1}{4}$, ♀ $1\frac{3}{4}$ inch.

Hab. Matheran Hill, Bombay (*Dr. Leith*); Deccan (*Dr. Day*); Madras (*W. Elliot*). In Coll. Dr. Leith, F. Moore, and W. W. Saunders.

Genus CREATONOTUS, Hübn.

CREATONOTUS RUBRICOSTA.

Male and *female* creamy white: fore wing with the costal border above and below red, with or without two black dots ascending obliquely upwards from near the base; a single dot at the lower end of discoidal cell, and a short thin black longitudinal line below the apex: abdomen red above, yellowish beneath, with a dorsal and lateral row of black spots: shaft of antennæ reddish, pectinations of male blackish; legs white, femora red above.

Expanse, ♂ $1\frac{1}{12}$, ♀ $1\frac{1}{4}$ inch.

Hab. Manpuri, North-west India (*C. Horne*); Bombay. In Coll. W. W. Saunders and F. Moore.

Genus SPILOSOMA, Steph.

SPILOSOMA DENTILINEA.

Male whitish testaceous: hind wing suffused with reddish testaceous exteriorly: fore wing with two median transverse interrupted series of black dots, those on the hind margin being the largest; a zigzag black submarginal line from below the apex to near posterior angle; a black dot at base of wing and one also at upper end of cell: hind wing with an ill-defined zigzag blackish line below the apex, and a small rounded black discal spot. Underside: base of fore wing suffused with crimson; markings as above, but

less distinct. Palpi black at apex, basal joint crimson laterally; femora crimson; tibiæ and tarsi black.

Expanse $1\frac{5}{8}$ inch.

Hab. Sikkim. In Coll. F. Moore.

SPILOSOMA BRUNNEA.

Male fuliginous brown, hind wing the darkest; veins of fore wing pale brown, those of hind wing testaceous: fore wing with three transverse pale-bordered, outwardly curved, jet-black maculated bands, the first being one third from the base, the second one third from the apex, the third interrupted below the apex and not reaching the hind margin; a black spot at end of cell, and another at base of costa: cilia of hind wing testaceous: abdomen crimson-red above, brown beneath, with a dorsal and lateral row of black spots; head and thorax pale brown; base of palpi pale brown, with a lateral crimson spot, terminal joint black; femora crimson above, tibiæ and tarsi blackish. Underside of wings mostly fuliginous black, anterior margins dull crimson.

Expanse $1\frac{1}{2}$ inch.

Hab. Bombay. In Coll. Royal Dublin Society and F. Moore.

SPILOSOMA TODARA.

Male reddish testaceous, suffused with pale blood-red on the abdominal half of hind wing: fore wing with a black dot at extreme base, another on the costa at one fourth its length, a third at the upper end of discoidal cell, a more or less distinct spot on hind margin one third from the base, and a pair of spots vertically contiguous one third from exterior angle; from the latter an indistinct blackish recurved band proceeds upward to the costa: hind wing with a large well-defined blackish comma-like discal spot: basal joint of palpi reddish, second and third joints black; antennæ, tibiæ, and tarsi black; femora red above, testaceous white beneath; head and thorax yellowish testaceous; abdomen blood-red above, testaceous white beneath, with a lateral row of black spots, dorsal row hid by the pubescence. Underside: fore wing suffused with blood-red; each wing with a small basal and a large discal black spot.

Expanse $1\frac{3}{4}$ inch.

Hab. Coonoor, Nilghiris (*Dr. F. Day*). In Coll. F. Moore.

Subfam. LIPARINÆ.

Genus PROCODECA, Walk.

PROCODECA TESTACEA.

Male and *female* very pale suffused testaceous; hind wing pale in the male; fore wing of male with a row of very indistinct black submarginal dots; body, antennæ, palpi, and legs brighter testaceous.

Expanse, ♂ $1\frac{2}{10}$, ♀ $1\frac{7}{10}$ inch.

Hab. Bengal. In Coll. W. W. Saunders and F. Moore.

Genus Naxa, Walk.

NAXA PUNCTICILIA.

Male and *female* white, opaque, squamous: fore wing with a black line extending along nearly one half of the extreme edge of costal margin; a black spot in middle of the cell; a row of six black spots on cilia, and a single apical spot on cilia of hind wing: legs streaked with black; pectinations of antennæ pale brown.

Expanse, ♂ $1\frac{2}{8}$, ♀ $1\frac{3}{8}$ inch.

Hab. Nilghiris (*Dr. F. Day*). In Coll. W. W. Saunders and F. Moore.

Genus Deroca, Walk.

DEROCA MACULATA.

Male. Wings semihyaline, white: fore wings with fuliginous bar-like spots at the base and on the veins along the costa; a marginal and submarginal medianly interrupted series of lunular spots, the two series divided by smaller diamond-shaped spots; a double discocellular spot: hind wing with a medianly interrupted series of fuliginous marginal spots, a less distinct submarginal series and a third bar-like series on the veins: body and legs white; fore and hind legs fuliginous above, with white spots; antennæ fuliginous.

Expanse $1\frac{4}{5}$ inch.

Hab. Masuri, North-west Himalayas, 7000 feet. In Coll. Capt. Lang, W. W. Saunders, and F. Moore.

Genus Hypercompa.

HYPERCOMPA REGALIS. (Plate XXXIII. fig. 7.)

Allied to *Hyp. hera*. Fore wing buff-colour, tinged with ochreous red at posterior angle, with a black elongated spot at base, a fusiform streak along middle of posterior margin, an outwardly oblique tapering band from middle of costa, and another similar band from the apex, between which is a parallel line with a zigzag end, each terminating before the posterior angle, where there are three small spots, and above these a narrow marginal line: hind wing ochreous red, with a marginal row of black spots, of which the one at the anal angle is the largest: palpi ochreous red; antennæ brown; front of head black; top of head and thorax whitish, with a black collar, a maculated band across the middle, and a triangular median spot on the waist: abdomen ochreous yellow. Underside pale ochreous red, tinged with yellow at base and on exterior margin; the median oblique band partly, and the marginal spots on hind wing only visible. Tibia above and tarsi brown.

Expanse 2 inches.

Hab. North India. In Coll. W. W. Saunders.

Subfam. Bombycinæ.

Genus nov. Norasuma.

Female. Wings elongate: fore wing with the costa very much

arched before the apex, thence abruptly descending and forming an acute apical point; exterior margin oblique, recurved, not scalloped; first subcostal veinlet four-branched, the second, third, and fourth branches starting at one third their length from each other, the second subcostal veinlet starting from the junction of the first with the discocellular, the discoidal veinlet crossing the discocellular and extending within the cell to one third its length: hind wing produced, anterior angle extended beyond the posterior margin of fore wing; exterior margin rounded, very slightly scalloped; anal angle not acute, abdominal margin slightly grooved. Antennæ very short, bipectinate to the tips. Body ample; abdomen with a longitudinal dorsal crest extending its whole length.

Allied to the genus *Bombyx* and *Theophila*.

NORASUMA JAVANICA. (Plate XXXIII. fig. 6.)

Female. Fore wing greyish brown, with a whitish-grey patch above and below the apex; four equidistant, very indistinct transverse discal undulating blackish lines, the outer line with a pale exterior border, the two median lines the darkest, all terminating abruptly inward on the costa; numerous fawn-coloured freckles scattered on the disk: hind wing greyish brown at the base, dark fawn-colour exteriorly; veins indistinctly paler; an indistinct transverse pale discal line: abdominal margin blackish, with grey streaks; thorax and abdomen greyish brown, abdomen with very narrow indistinct whitish rings; antennæ and legs brown. Underside darker; apex of fore wing dark brown; hind wing freckled with numerous dark brown and white scales near anal angle; two short discal bands extending from abdominal margin.

Expanse $2\frac{1}{2}$ inches.

Hab. Java (*Wallace*). In Coll. W. W. Saunders.

Genus THEOPHILA, Moore.

THEOPHILA MANDARINA. (Plate XXXIII. fig. 5.)

Female grey: fore wing with a well-defined antemedian curved transverse brown band, and a transverse postmedian suffused brown line, beyond which is a submarginal white-bordered recurved narrow line, outside of which is a suffused brown patch below the apex; discocellular mark indistinct: hind wing brown, with a whitish submarginal line, and two white spots on abdominal margin: thorax brown; waist-band grey; antennæ fuliginous, shaft grey.

Expanse $1\frac{6}{8}$ inch.

Hab. Neighbourhood of Shanghai (*Mr. Pryer*). In Coll. F. Moore.

"Larva feeds on mulberry, and spins a white silk cocoon about three quarters of an inch long."—*E. Holdsworth*.

Allied to *T. huttoni* from the North-west Himalayas; but the wings in this species are less scalloped, and it is a much smaller insect.

Subfam. NOTODONTINÆ.

Genus DUDUSA, Walk.

DUDUSA SPHINGIFORMIS. (Plate XXXIV. fig. 1.)

Male. Fore wing pale testaceous brown, with darker brown suffused streaks along the middle of the wing from base to near the apex; veins black; two irregular median transverse zigzag pale lines with more or less dark borders, terminating on the costa and hind margin in black streaks; exterior margin deeply scalloped and having three pale lunular lines, the median one being broad, the others narrow; the inner line with a contiguous black and a grey zigzag line crossing each other: hind wing dark fuliginous brown, with three narrow exterior marginal pale lunular lines to near the apex, a short zigzag pale line from anal angle, and an indistinct dark discal spot. Thorax pale testaceous brown, with dark brown lateral streaks. Abdomen fuliginous black, with some pale lateral streaks near the base and apex, and a large dense anal tuft of long spatulated hairs. Head, palpi, and antennæ fuliginous black.

Expanse $3\frac{1}{2}$ inches, length of body 2 inches.

Hab. Sikkim. In Coll. Capt. A. M. Lang and F. Moore.

Subfam. SATURNIINÆ.

Genus NEORIS, Moore.

NEORIS SHADULLA.

Male and *female*. Both wings with a broad median transverse grey band, palest on hind wing, the band bordered on each side by a black line, the inner or basal line being straight and extending from abdominal margin to the subcostal vein of the fore wing, and then indistinctly branching to base, the basal portion of the cell being white and the lower part of this wing streaked longitudinally with black; the outer line of band double, lunular on hind wing and zigzag on fore wing, terminating on the costa in a black spot, and bordered outwardly its entire length with white, the outer margin of the wings being fulvous brown and tinged at the apex of fore wing with red. Base of both wings with lax red hairs. Ocelli on both wings prominent, each encircled by a jet-black line which has a white streak along its inner half, middle of ocelli reddish brown outwardly and yellow inwardly, being divided by a narrow white-bordered talcose lunule. Underside as above, inner border of band almost obsolete. Ocellus of fore wing prominent, that of the hind wing composed only of a black narrow border to the talcose lunule. Body fulvous brown, thorax above with a white collar and black streak; segments of abdomen black-fringed. Antennæ fulvous brown.

Expanse, ♂ 4 inches, ♀ $3\frac{3}{4}$ inches.

Hab. Shadulla, near Yarkund, Eastern Turkestan. In Coll. F. Moore.

Note. The above species was collected by Mr. Shaw and Dr.

Henderson, who accompanied Mr. Forsyth during his late mission to Yarkund.

Genus CALIGULA, Moore.

CALIGULA CACHARA.

Male yellowish brown: fore and hind wings with two contiguous postmedian transverse lunular blackish lines, which on the fore wing are slightly zigzag before the costa and there terminate in a small elongated white-bordered black costal patch before the apex: fore wing with space from the base to the postmedian lines irrorated with minute black and grey scales, and an indistinct black-speckled submarginal line: hind wing with a well-defined whitish-yellow narrow lunular submarginal line. Ocelli of both wings large, rounded, with a grey central lunate mark; outer ring jet-black exteriorly, and bright pink interiorly, the latter bordered with an inner white line. A suffused brown transverse streak from costa to abdominal margin, passing through the ocelli exteriorly.

Expanse $3\frac{1}{8}$ inches.

Hab. N. Cachar (*Major Godwin-Austen*). In Coll. F. Moore.

Genus nov. RHODIA.

Wings ample, elongate, costa of fore wing in the male rounded, attenuated and falcated at the apex; hind wing rounded exteriorly. Body thick, short. Antennæ bipectinated to the tip. Ocelli hyaline, of a blunt oval shape.

Cocoon bag-shaped, compact, pendent from twigs.

RHODIA NEWARA.

Male and *female* dark yellow, both wings with a rather small discocellular hyaline spot of a blunt oval shape, having an inner white marginal line but no outer rings; a transverse subbasal reddish-black band, acutely angled on the hind wing; an undulated similar-coloured band traversing both wings transversely beyond the hyaline spot, being broadly bordered outward with ferruginous, and thickly irrorated with white scales, beyond which is a zigzag line dentated across and also between the veins, the space between which and the inner margin of the band on the hind wing is completely filled up with dark ferruginous brown, terminating on the costa of fore wing near the apex by a recurved black patch with a white outer-bordered line; hyaline spots densely bordered with ferruginous brown scales; front of thorax, costa, and anterior portion of fore wing irrorated with ferruginous and white scales; exterior margin of both wings with a narrow pale fuliginous indistinct border.

Expanse 5 to $5\frac{1}{2}$ inches.

Hab. Kathmandoo, Nepal (*General Ramsay*). In Coll. F. Moore.

"Cocoon brilliant green, perfectly naked; pendent from twigs of weeping-willow. End of November and beginning of December."

Subfam. Lasiocampidæ.

Genus Apona, Walk.

Apona, Walk. Cat. Lep. Het. B. M. vii. p. 1762 (1856).

Wings rather broad, costa convex towards the apex, which is slightly acuminate in the male and falcate in the female. Body thick, thorax covered with dense long hairs. Palpi very short, thickly clothed with long hairs. Antennæ long, half the length of costa, very broadly plumed to the tip in the male, pectinate in the female. Legs stout, densely clothed with long hairs; hind tibiæ with two moderately long thick apical spurs.

Apona pallida.

Apona pallida, Walk. Cat. Lep. Het. B. M. vii. p. 1763 (1856), ♀.

Male and *female* brownish fawn-colour, with a pale chestnut-brown patch below the apex and extending along the exterior margin: fore wing with two transverse chestnut-brown narrow bands, which are oblique, and slightly recurved, but not undulated, the outer band bordered exteriorly with broad contiguous alternately long and short brown patches, the dividing veins on which are dark chestnut-brown in the male and paler in the female; between these are three parallel paler lunular bands; a dark brown discal dot within the cell: hind wing with similar transverse but less distinct bands. Underside as above, the transverse bands distinct. Thorax chestnut-brown. Antennæ of male with very broad bright chestnut plumes, the shaft being white.

Expanse 4 inches.

Hab. Sikkim. In Coll. British Museum and F. Moore.

Apona plumosa, Moore.

Male greyish fawn-colour, exterior border of fore wing chestnut-brown: fore wing with transverse narrow bands beyond the cell; the exterior band straight, oblique, bright chestnut-brown, with whitish inner line; inner band blackish brown, zigzag; between the outer and inner bands are three indistinct parallel lunular bands; a black discal dot: hind wing with indistinct inner and outer transverse bands; exterior border of wing brown. Thorax and body chestnut-brown. Antennæ half the length of costa, with broad bright chestnut-brown plumes, shaft white. Underside uniform pale chestnut-brown; transverse bands indistinct.

Expanse 3⅜ inches.

Hab. Kurnool, Nilghiris (*Dr. F. Day*). In Coll. F. Moore and W. W. Saunders.

Genus nov. Alompra.

Male and *female*. Fore wings elongated, narrow; costa convex near the apex, which is acute; exterior margin very oblique, convex at the angle, hind margin one half the length of costa: hind wings short, trigonal; anterior margin very convex at the base, thence

straight to the apex, which is acute, and produced in the male, and extending beyond hind margin of fore wing; exterior margin convex; subcostal vein with six branches, the first branch starting from near the base at one half the length of the discoidal cell, thence proceeding to the costa near the apex; second starting from near end of the cell and sending forth a short or third branch near the apex; the fourth branch starts with the second; the fifth from one-third, and the sixth near the juncture, of the fourth, but outside the cell. Body robust, abdomen extending beyond hind wings. Legs short, densely clothed with hairs. Palpi short, densely pilose; third joint minute, imbedded in the hairs of second. Antennæ very small, short, curved backward, bipectinate in both sexes.

ALOMPRA FERRUGINEA. (Plate XXXIII. fig. 8.)

Male and *female* bright ferruginous: fore wing with a transverse curved row of black dots one fourth from the base, and a single dot at the base, and broad median and an exterior pale fuliginous-brown band, the former commencing from the costa near the base of the cell, and attenuating to middle of the hind margin outside the row of spots, and enclosing a red spot beyond the cell, the two bands partly divided posteriorly by a lunular red streak; the veins crossing the median band brown in the male, grey in the female, the portion crossing the exterior band being red: hind wing of male fuliginous between the veins along the exterior margin, this wing in the female being uniform ferruginous. Entire body and legs ferruginous. Shaft of antennæ jet-black, pectinations reddish yellow.

Expanse, ♂ $2\frac{3}{8}$, ♀ $3\frac{3}{8}$ inches.

Hab. Darjeeling (*A. Grote*). In Coll. F. Moore, W. W. Saunders, and Captain Lang.

GEOMETRES.

Genus ODONTOPTERA, Steph.

ODONTOPTERA CHALYBEATA. (Plate XXXIV. fig. 4.)

Allied to *O. discospilota*.

Dark dead green, washed with chalybeous, costal margin speckled with brown: both wings with a large rounded black discal spot, that on the hind wing the largest; two transverse submarginal brownish-green lunular lines with chalybeate-white borders. Thorax, vertex, and body green; front of head and palpi blackish. Exterior margin of both wings sharply dentate, and having a narrow brown marginal line; cilia buff-colour. Underside of wings and legs fawn-colour.

Expanse $1\frac{5}{8}$ inch.

Hab. N. India. Coll. W. W. Saunders.

Genus GEOMETRA, Linn.

GEOMETRA LINEATA. (Plate XXXIV. fig. 2.)

Male pale yellowish green: fore wing with a narrow brown-speckled yellowish costal band; two median transverse pale yellow

narrow lines from costa to hind margin, the outer line crossing the hind wing to near the anal angle: both wings with a brown dentate discal mark, the lower portion of which has a white centre: hind wing with a brown spot at the angle on middle of exterior margin. Cilia pale glossy fawn-colour. Head and body green. Antennæ and palpi brown.

Expanse 1¾ inch.

Hab. Sikkim. In Coll. W. W. Saunders and Captain Lang.

GEOMETRA ALBOVIRIDIS. (Plate XXXIV. fig. 3.)

Male dark green basally, white exteriorly: fore wing with a broad whitish brown-speckled costal band; exterior margin of both wings broadly white, the junction with the green being well defined by a recurved dividing line, outside which are some green and pale brown streaks; exterior margin defined by a narrow brown lunular line; some short transverse white strigæ on fore wing. Cilia white. Thorax and body green. Head yellow. Palpi and antennæ brown.

Expanse 1¾ inch.

Hab. N. India. In Coll. W. W. Saunders.

CRAMBICES.

Genus CHILO, Zeller.

CHILO CERVINELLUS. (Plate XXXIV. fig. 7.)

Fore wing brownish fawn-colour, paler between the markings; a longitudinal black streak extending from the base below the discoidal cell, and thrice interrupted by the veins, above which is another streak extending from within the cell to the exterior margin; a row of black dots on exterior margin: hind wing pale fawn-colour. Underside pale fawn-colour; markings of the upperside not visible. Palpi, head, and thorax whitish fawn-colour. Antennæ and abdomen brownish fawn-colour. Legs blackish.

Expanse 1¾ inch.

Hab. Nilghiris, S. India. In Coll. W. W. Saunders.

CHILO BIVITELLUS. (Plate XXXIV. fig. 8.)

Fore wing brownish white, with a black, indistinctly interrupted, longitudinal streak from base to exterior margin, a similar interrupted streak along posterior margin; exterior margin with a series of black dots: hind wing very pale fawn-colour. Underside paler, the upper band of fore wing only being indistinctly visible. Palpi, antennæ, body, and legs pale brown.

Expanse 1¼ inch.

Hab. Bombay (*Dr. Leith*). In Coll. F. Moore.

CHILO INTERRUPTELLUS. (Plate XXXIV. fig. 5.)

Fore wing creamy white, slightly tinged with testaceous; a black longitudinal streak extending from base below the discoidal cell, and

thrice interrupted by the veins, above which is another streak from within the cell to the exterior margin, where there is a series of black dots: hind wing clear white. Underside paler, the streaks on the fore wing indistinctly visible. Palpi, head, body, antennæ, and legs creamy white. Anal tuft yellowish.

Expanse $1\frac{1}{2}$ inch.

Hab. Bombay (*Dr. Leith*). In Coll. F. Moore and W. W. Saunders.

CHILO INCONSPICUELLUS. (Plate XXXIV. fig. 6.)

Fore wing creamy white, with an indistinct fuliginous longitudinal streak from base below the cell, thrice interrupted by the veins, and a short streak above to near the exterior margin, where there is a series of fuliginous dots; hind wing fuliginous. Underside paler. Palpi, antennæ, and legs creamy white. Body fuliginous.

Expanse $1\frac{3}{8}$ inch.

Hab. Bombay. In Coll. W. W. Saunders.

Genus JARTHEZA, Walker.

JARTHEZA BIPLAGELLA. (Plate XXXIV. fig. 9.)

Fore wing yellowish brown; a prominent straight silvery-white longitudinal band extending from the base below the cell, a little beyond which it imperceptibly terminates; beneath and joining this band is a parallel jet-black streak of the same width, but tapered at each end; costa whitish, the extreme margin with a black border; a linear series of black scales within the cell, two small black spots on discocellular veins, beyond which are two longitudinal series of black scales; two transverse submarginal bands on exterior border, the first brown, the second silvery, the border beyond and the cilia white, the exterior border and the tip of the cilia being margined with a silvery line; between the extreme border and the inner silvery line is a transverse series of black dots: hind wing silky white, with a very slight brownish shade from the anal angle along exterior margin. Head, thorax, and body white; tegulæ black. Antennæ and legs brownish white.

Expanse $1\frac{2}{12}$ inch.

Hab. Bombay. In Coll. W. W. Saunders.

DESCRIPTION OF THE PLATES.

PLATE XXXII.

Fig. 1. *Lebadea austenia*, p. 560.
2. *Neptis emodes*, p. 561.
3. —— *mahendra*, p. 560.
4. —— *susruta*, p. 563.
5. *Neptis clinia*, p. 563.
6. —— *viraja*, p. 563.
7. —— *khasiana*, p. 562.
8. —— *adipala*, p. 563.

PLATE XXXIII.

Fig. 1. *Calpenia saundersi*, p. 571.
2. *Neochera tortuosa*, p. 570.
3. *Agrisius fuliginosus*, p. 571.
4. *Bizone gazella*, p. 572.
5. *Theophila mandarina*, p. 576.
6. *Norasuma javanica*, p. 576.
7. *Hypercompa regalis*, p. 575.
8. *Alompra ferruginea*, p. 580.

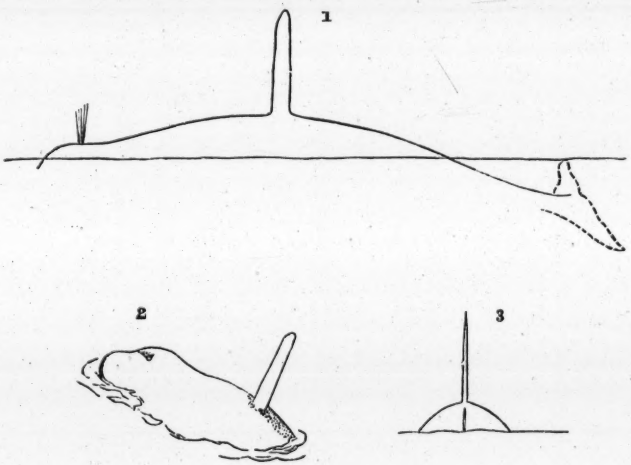
PLATE XXXIV.

Fig. 1. *Dudusa sphingiformis*, p. 577.
2. *Geometra lineata*, p. 580.
3. —— *alboviridis*, p. 581.
4. *Odontoptera chalybeata*, p. 580.
5. *Chilo interruptellus*, p. 581.
Fig. 6. *Chilo inconspicuellus*, p. 582.
7. —— *cervinellus*, p. 581.
8. —— *bivitellus*, p. 581.
9. *Jartheza biplagella*, p. 582.

6. Note on a Cetacean observed on the West Coast of Ceylon. By E. W. H. HOLDSWORTH, F.L.S., F.Z.S.

[Received April 9, 1872.]

Whilst becalmed a few miles off Chilaw, on the west coast of Ceylon, on the 7th of April, 1868, my attention was attracted by hearing, not far from the vessel, the blowing sound usually produced by Cetaceans when they have come to the surface to breathe. I found that the noise proceeded from a small Whale, which was lying motionless, with its back exposed, not more than fifty yards from the vessel. The first flaws of the sea-breeze had not yet appeared on the water, and the surface was undisturbed by even a ripple. It was a favourable time for observation; and as I had a good binocular glass and my note-book by my side, I was at once able to observe distinctly and to sketch that portion of the body of the animal which was seen above water. From first to last, it was more or less visible for four minutes; and during that interval it blew five times. The whole animal was not seen; but from such parts of it as rose at different times above the surface it appeared to be about twenty-five feet long, with a rounded back and a rather thick body. Its most remarkable feature, and the one to which I wish especially to direct attention, was the dorsal fin (fig. 1, p. 584), which could not have been less than five feet high, standing erect on the highest part of the back and shaped like the pointed extremity of an ordinary sword, with the anterior edge slightly convex and the posterior straight. After breathing, the animal very slowly sank in a horizontal position till only half the dorsal fin was left exposed; and so it remained for about thirty seconds, when it again came to the surface and blew as before; this was repeated four times after its first appearance, before the animal finally went down. The profile of the head was not entirely seen, so that the shape of the nose, whether beaked or otherwise, could not be ascertained; but the top of the forehead, when looked down upon from behind as the animal rose head first on one occasion in an altered position, presented a broad rounded outline (fig. 2), with an indentation in the centre leading to a distinct longitudinal depression on the top of the head, in which the blow-hole was placed. The alteration in the position of the animal from broadside to nearly end-on enabled me to see also that the dorsal fin had the thin flattened shape (fig. 3) usual in that appendage. After the fifth breathing the head sank down, the broad transverse flukes showed for a moment at the surface, and the animal finally disappeared. Its behaviour was evidently that of a true Whale, and totally unlike that of Dolphins and other small Cetaceans, which



only show above water at short intervals for one or two seconds at a time and do not check their headlong career when they come to the surface to breathe.

Some of the crew of my vessel who were looking at this Whale told me they had seen the same animal before; and although there is not much reliance to be placed generally on what the natives say when they see you are interested in the subject, inasmuch as they usually endeavour to tell you exactly what they think will be most agreeable, it may be worth while to note the few particulars I gathered from them.

They called it the "Palmyra fish," but did not seem to know why that name had been given. I may mention that most of the crew I had in this vessel were Malabar men and natives of a coast where the tall palmyra is almost the only tree to be seen; and it may be that the high erect fin of this species of Whale had before now recalled the appearance of this tree and suggested the name of "Palmyra fish," by which the animal appeared to be known. They said it was most frequently seen to the west of Cape Comorin, and that from its habit of remaining for a time at the surface it sometimes came in the way of vessels working along that coast. They also said these Whales were very pugnacious, fighting furiously at times among themselves, and "running against each other like sheep." They were consequently avoided as much as possible by the native craft.

The colour of those parts of this Whale which were visible above water (namely, the top of the head, back, dorsal fin, and tail) was greyish black; but I was unable to ascertain either the colour or shape of the underparts. What I saw of the animal gave me the idea of its being of comparatively short and thick proportions; but

the shape of the dorsal fin, the manner in which it was set on the back, the form of the top of the head, and the approximate position of the blow-hole are characters of which I can speak with confidence, and which I believe are represented with a close approach to accuracy in the accompanying outlines, reduced from the sketches I made from the animal itself. The place where I fell in with this Whale was about seven miles from the land, in the deep water of the Gulf of Mannar, just beyond the bank of soundings which runs along the coast of Ceylon; and although I spent many weeks every year in cruising on that coast whilst engaged in pearl-fishery work, and saw numbers of the smaller Cetaceans, I never met with an animal of this description except on the occasion I have mentioned.

This Cetacean was more or less visible for quite four minutes (three minutes and a half from the time of its partial submersion after its first breathing), and under favourable circumstances for observations; but the particulars I have been able to give are of course insufficient to enable me to say to what special group of Whales this one may belong. It would be easier to point out, if necessary, those from which its observed characters and manners would seem to exclude it; but there would still remain so many groups in which our ignorance of external characters might permit it to be included that no definite conclusion could be arrived at from a consideration of its possible affinities. The only recognized Cetaceans having a dorsal fin at all resembling in size and form that I have described are:—(1) The one to which Steenstrup has given the name *Orca eschrichtii*, from the Färoe Islands; of this the copy of a rough sketch is given by Eschricht in his paper "On the Northern Species of *Orca*," which forms part of the 'Recent Memoirs on the Cetacea' published by the Ray Society, 1866, p. 187, and edited by Professor Flower. In this case, however, the dorsal fin, although fully five feet high in an animal apparently about twenty-two feet long, is rather different in form from the one I have been speaking of; it tapers from the base upwards, and is directed somewhat backwards instead of being vertical. (2) *Orca rectipinna*, Cope*, ranging "from California southwards." The fin in this species stands quite erect, and is six feet high in an animal twenty-five feet long, but tapers regularly from a breadth of about eighteen inches at the base to its pointed apex, in this respect differing materially from the narrow sword-like form of the one under notice. The species of *Orca* and of the allied genus *Grampus* are very predaceous animals; they are active and dashing in their movements, as I have had many opportunities of observing in the case of the *Grampus* on the English coast; in this habit they resemble the Dolphins, as well as in not stopping when they come to the surface to breathe. This is entirely different from the generally sluggish and true whale-like manners of the animal I observed in the Gulf of Mannar. Professor Owen has within the last few years described in our 'Transactions' (vol. vi. pt. 1, 1866) no less than

* "On the Cetaceans of the Western Coast of North America," by C. M. Scammon, edited by E. D. Cope, Proc. Acad. Nat. Sci. Phil. vol. xxi. p. 22 (1869).

seven species of small Indian Cetacea, one of them being remarkable for its affinity to the Sperm-Whale (*Physeter*); and there is no reason to suppose we have not still a good deal to learn about the Cetacea of that region. It is not improbable, therefore, that the so-called "Palmyra fish" may belong to a section hitherto unnoticed; and I have now brought the subject before the Society in the hope that these notes may fall into the hands of persons having opportunities of making further observations on the animal, and of obtaining information on the many points about which unfortunately I can say nothing.

It may be worth while recording here a circumstance in connexion with the Cetacea, which came under my notice one day whilst I was at anchor on the Pearl Banks. Besides the well-known Dugong (*Halicore*), which the late Sir J. Emerson Tennent has figured (Nat. Hist. of Ceylon, p. 69, 1861) sitting up in the water like a supposed mermaid (a position never observed by myself or any one I have been able to meet with), three easily distinguished forms of Dolphin or Porpoise frequented the north-west coast of Ceylon—one of them, remarkable for its long slender snout, being probably *Delphinus longirostris*. A herd of about two hundred of this species, the largest number I ever saw together, was one day observed slowly advancing in a closely packed line towards the vessel. They were making a great commotion and apparently driving a shoal of small fish; but whilst thus engaged, I distinctly observed, at least four or five times, a pair of these animals assume a vertical position, with their heads well above the surface, for three or four seconds. This attitude is so precisely what has been described by several persons who have had good opportunities of observing Cetaceans as the one assumed whilst *in copulâ*, that I have no doubt what I then saw will bear the same explanation. The performance was repeated in different parts of the line, but only at one place at a time, as if there were one eager male paying his attentions successively to different individuals of the opposite sex. This is what might be expected among gregarious animals; but the frequency with which I have observed a single pair of Porpoises in our own harbours leads me to doubt whether even the generally gregarious species of Cetacea are in all cases unrestricted in their loves, and to believe that pairing, at all events during part of the year, may be the rule with some of them.

7. On the Reptiles and Amphibians of Borneo.

By Albert Günther, M.A., M.D., Ph.D., F.R.S., F.Z.S.

[Received March 21, 1872.]

(Plates XXXV.–XL.)

In order to determine the specimens of a considerable collection of Reptiles and Amphibians, made by Mr. Everett at Matang in the district of Sarawak, and recently purchased by the Trustees of the



G.H.Ford.

Mintern Bros. imp.

A. DRACO CRISTATELLUS. B. DRACO SPILONOTUS

BRITISH
MUSEUM
26OC73



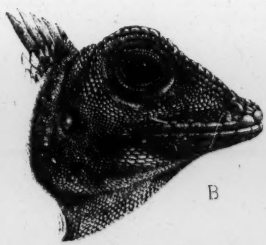
G.H.Ford

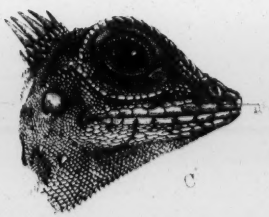
Mintern Bros. imp.

TIARIS LEOCASTER

BRITISH
2800c73
MUSEUM

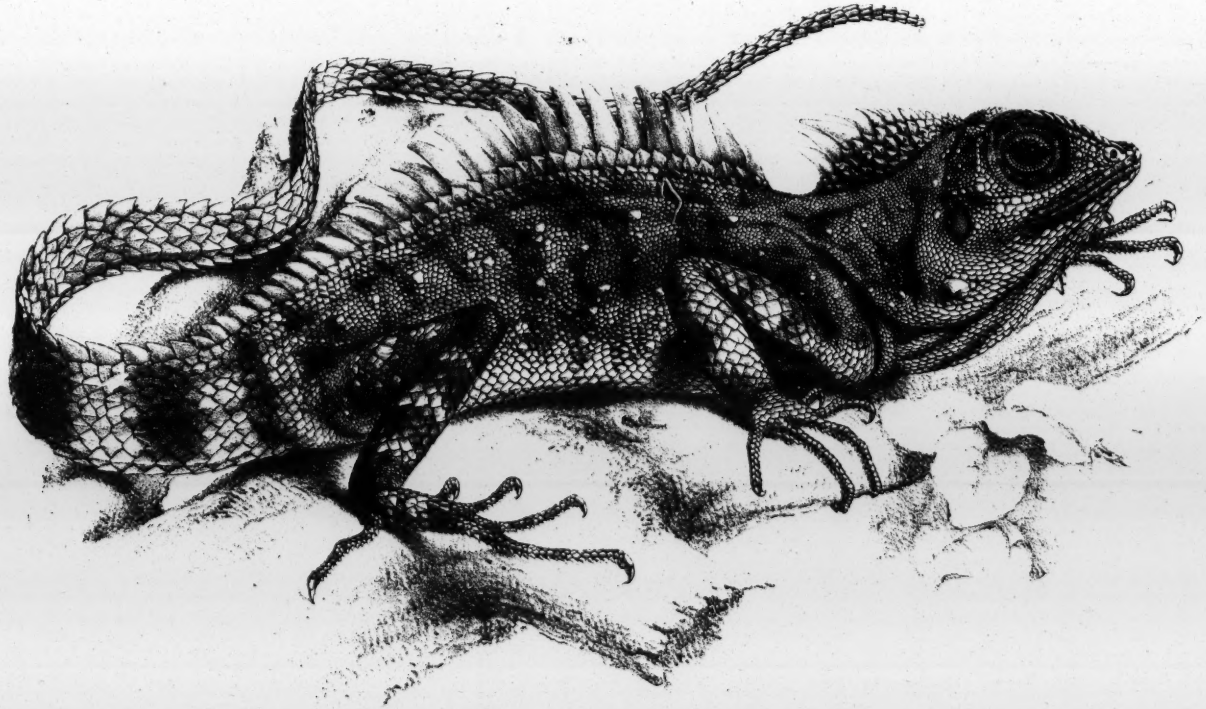






G.H.Ford. Mintern Bros. imp.

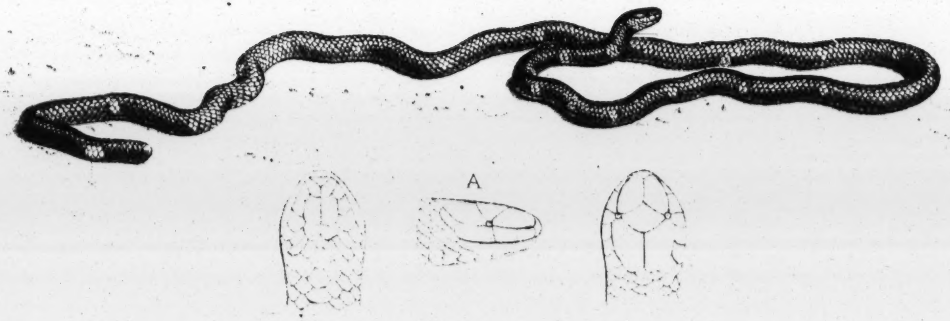
A. LOPHOCALOTES INTERRUPTUS.
B. TIARIS MIOTYMPANUM. C. TIARIS SOPHIÆ.

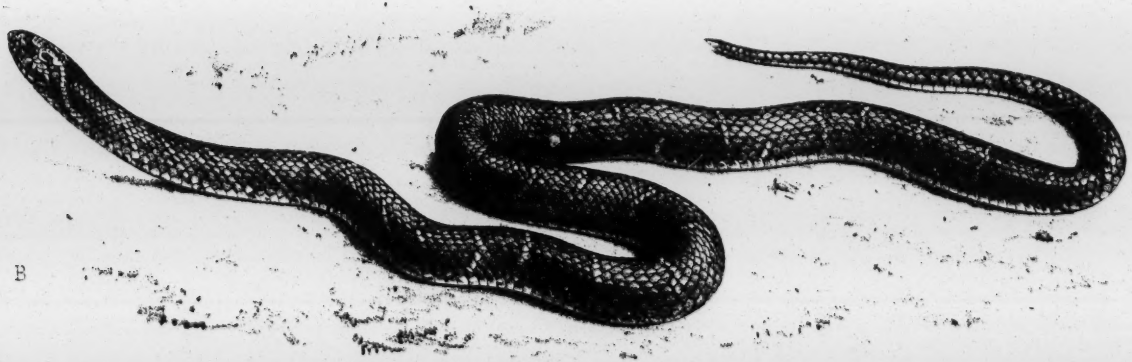


TIARIS TUBERCULATUS

Mintern Bros. imp.

BRITISH MUSEUM
28 OCT 73





C.H.Ford

Mintern Bros imp

A. CALAMARIA GRACILLIMA. B. SIMOTES SUBCARINATUS

BRITISH MUSEUM
9 OCT 73
LIBRARY

BRITISH
MUSEUM
2800C73



G.H.Ford. Mintern Bros. imp.

A.RANA CONSPICILLATA. B.HYLORANA JERBOA

BRITISH
280C73
MUSEUM

British Museum, I have found it necessary to collect all the information regarding the herpetology of Borneo which is scattered through various works and periodicals.

The first extensive collections received in Europe were from two localities:—1. From the Dutch settlements in the south of the island, at Banjermassin, whence G. Müller and others sent to the Leyden Museum the specimens described by Schlegel in the "Bydragen tot de Dierkunde" (Verhandelingen over de natuurl. Geschiedenis der Nederlandsche overzeesche bezittingen) and in the 'Essai sur la Physiognomie des Serpens.' 2. From the principality of Sarawak, where Sir J. Brooke, Sir E. Belcher, and Mr. Low paid for a considerable period much attention to the fauna. The collections made by them were presented to the British Museum, and described partly by Dr. Gray, and partly more recently by the author in the Catalogues of the British Museum and in the 'Reptiles of British India.'

Another large collection was made at Labuan by Mr. J. Motley, for, or with the assistance of, Mr. L. Llewellyn Dillwyn. It was the intention of these gentlemen to publish an illustrated work containing a full account of the animals, both vertebrate and invertebrate, inhabiting that island; and, indeed, one part of this work, entitled 'Contributions to the Natural History of Labuan and the adjacent coasts of Borneo,' was issued in 1855; but the undertaking was abandoned in consequence of the death of Mr. Motley. This part contains descriptions of fourteen reptiles, some of which are beautifully illustrated. Some years ago the collection made at Labuan was presented by Mr. Dillwyn to the British Museum; unfortunately it had been mixed up with another obtained at Banjermassin.

The next contribution to Bornean herpetology was made by Dr. Bleeker, who reported, in the 'Natuurk. Tyds. for Nederl. Indië,' on several collections received from various localities. He enumerates some twenty species from Sinkawang (vol. xvi. 1859, pp. 37, 188), and seven from Montrado (ibid. p. 197) on the west coast, three from Koti on the east coast (ibid. p. 206), and sixteen from Sintang (ibid. vol. xx. 1860, p. 200). In 1859 Dr. Bleeker was able to give a list of some ninety species known from Borneo (vol. xvi. pp. 438–441), which number, however, is reduced by a critical examination to eighty-four. It is a matter of some inconvenience that this author introduced into his lists many names of species which he has never described. From an examination of the typical specimens (which have been obtained for the British Museum) I find that but few of these names can be maintained, as the majority were given to known species, whilst others have been superseded by names given at a later period, but accompanied with a proper description.

A. C. J. Edeling has made a further addition to the fauna of Banjermassin. In 'Nederl. Tyds. Dierk.' ii. 1865, he enumerates sixteen species previously not known from that part of Borneo. And, finally, Prof. Peters has given descriptions of nineteen new species, collected by the Marquis Doria at Sarawak, in 'Monatsber. Berl. Acad.' 1871, p. 569.

Beside the Reptiles and Amphibians referred to in these publications, some have to be added that were incidentally described on other occasions, besides those contained in the collection recently brought from Matang. I cannot hesitate to express a belief that only a small part of the Reptiles of this island are known: its interior has never been searched; and even a great portion of its coasts are zoologically unknown. The places where the species in the list subjoined have been collected are the following:—

In the western parts (W.): Sarawak (Matang), Pontianak, Sintang, Sinkawang, Montrado.

In the southern parts (S.): Banjermassin (Martapoura).

On the east coast (E.): Koti.

In the northern parts (N.): Labuan.

I shall state in the list in which of these divisions each species is found, mark the species peculiar to Borneo by printing them in italics, and add an asterisk to those which in the British Museum are not represented by Bornean examples.

Tortoises.

1. *Cuora borneensis* (Schleg. et Müll.)	W.	S.		
2. Emys crassicollis (*Bell*).				
*3. Emys spengleri (*Schweig.*).				
*4. Geoemyda spinosa (*Schleg.*)	...	S.		
5. Cyclemys ovata (*Gray*)	W.			
6. *Batagur pictus* (Gray)	W.			
*7. Trionyx javanicus (*Geoffr.*)	...	S.		
*8. Trionyx subplanus (*Geoffr.*).				
*9. Chelonia imbricata (*auct.*).				
[?*10. Dermatochelys coriacea (*L.*).]				

Crocodiles.

11. Crocodilus biporcatus (*Cuv.*)	W.	S.	E.	N.
12. Crocodilus palustris (*Schleg.*).	W.			
13. *Gavialis schlegelii* (Müll.)	W.	S.		

Lizards.

14. *Monitor dumerilii* (Müll.)	W.	S.		
15. Hydrosaurus salvator (*Laur.*)	W.	S.	...	N.
16. Tachydromus sexlineatus (*Daud.*)	W.	S.		
17. Hinulia nævia (*Gray*).				
*18. *Mocoa nitens* (Ptrs.)	W.			
*19. *Mabouia parietalis* (Ptrs.)	W.			
*20. *Amphixestus beccarii* (Ptrs.)	W.			
*21. *Norbea brookii* (Gray)	W.			
22. Tiliqua rufescens (*Shaw*)†	W.	S.	...	N.

† Among various specimens of *Euprepes rufescens* collected at Matang, and more or less approaching the typical form from the continent of India, we received one which is, without the least doubt, *Euprepes percarinatus*, var. *borneensis*, of Peters, from the same part of Borneo; its scales are provided with from five to seven keels. This series of examples shows clearly that the relative position of the shields of the upper part of the snout, and the number and development of the keels of the scales, and also the coloration are subject to great variation, and that the var. *borneensis* cannot be specifically distinguished from *E. rufescens*, although, perhaps, the Javan *E. percarinatus* may be a really distinct species.

23. Tiliqua præornata (*Ptrs.*)† ..... W. S.
24. *Euprepes belcheri* (Gray).
25. Euprepes olivaceus (*Gray*) ..... W.
26. Hemidactylus brookii (*Gray*) ..... W.
27. Hemidactylus vittatus (*Gray*).
*28. Hemidactylus frenatus (*Schleg.*) .... S.
[?*29. Hemidactylus variegatus (*Cuv.*)‡ .... S.]
30. Nycteridium schneideri (*Shaw*)..... ... S. ... N.
31. *Pentadactylus borneensis* (Gthr.).
*32. *Pentadactylus dorsalis* (Ptrs.) ..... W.
33. Gecko monarchus (*Schleg.*) ..... W. S. ... N.
34. Gecko smithii (*Gray*)..... ... ... N.
35. Gecko albofasciolatus (*Gthr.*) §..... ... S.
[?*36. Platydactylus guttatus (*Cuv.*)‡ .... S.]
37. Ptychozoon homalocephalum (*Crev.*).
38. *Tarentola borneensis* (Gray).
39. *Heteronota kendallii* (Gray) ..... W.
40. Gymnodactylus marmoratus (*Kuhl*) ..... W.
41. Gymnodactylus consobrinus (*Ptrs.*)..... W.
42. Draco volans (*L.*) ..... W.
43. Draco fimbriatus (*Kuhl*) ..... W.
44. *Draco cornutus* (Gthr.) ..... W. ... ... N.
45. *Draco cristatellus* (Gthr.) ..... W.
[?*46. Draco hæmatopogon (*Schleg.*), according to Bleeker.]
47. *Gonyocephalus doriæ* (Ptrs.) ..... W.
*48. *Tiaris borneensis* (Schleg.).
49. *Tiaris liogaster* (Gthr.) ..... W.
50. *Tiaris miotympanum* (Gthr.) ‖..... ... ... N.
51. Dilophyrus grandis (*Gray*) ..... W.
52. Bronchocela cristatella (*Kuhl*) ..... W. S. ... N.
*53. Bronchocela jubata (*D. et B.*) .... S. (Edeling).
54. *Japalura nigrilabris* (Ptrs.) ..... W. S.

Snakes.

*55. Typhlops braminus (*Cuv.*)..... ... S. (Edeling).
*56. Pilidium lineatum (*Boie*) ..... W. S.
57. *Typhlocalamus gracillimus* (Gthr.) ..... W.
58. Cylindrophis rufus (*Laur.*) ..... W. S.
59. Xenopeltis unicolor (*Raw.*) ..... W. S.
60. *Calamaria borneensis* (Blkr.)..... W.
*61. Calamaria schlegelii (*D. et B.*).
62. Calamaria rœlandti (*Blkr.*).
63. Calamaria bicolor (*Schleg.*) ..... W.
64. *Calamaria arcticeps* (Gthr.) .... N.
65. Calamaria nigro-alba (*Gthr.*) .... S.
66. *Calamaria flaviceps* (Gthr.) ..... W.
67. Calamaria temminckii (*D. et B.*).
68. Calamaria agamensis (*Blkr.*)..... W.

† This species had been previously described by Edeling (Nederl. Tyds. Dierk. ii. 1865, p. 201) under the name of *Apterygodon vittatum*. The specific name having been preoccupied for an African species, I retain the name proposed by Peters. Bleeker also knew this species; at least we received a specimen from him with the MS name "*Euprepes ceramensis*;" so that this Lizard does not appear to be confined to Borneo.

‡ According to Bleeker, *l. c.* xvi. p. 438. I doubt the occurrence of this species in Borneo.

§ Of this species we have received three specimens from Dr. Bleeker under as many different names, viz. *Platydactylus pentonopus*, *Platydactylus borneensis*, and *Hemidactylus* [illegible]*erophorus*.

‖ An = *Gonyocephalus chamæleontinus*, Motley et Dillwyn?

*69.	Calamaria benjaminsii (*Edeling*)	...	S.	
*70.	Calamaria martapurensis (*Edeling*)	...	S.	
71.	*Simotes subcarinatus* (Gthr.)	W.		
72.	Simotes octolineatus (*Schneid.*)	W.	S.	
73.	*Simotes labuanensis* (Gthr.)	W.	...	... N.
74.	*Simotes vertebralis* (Gthr.).			
75.	Ablabes melanocephalus (*Gray*) †	W.	S.	
76.	Ablabes baliodirus (*Boie*)	W.	S.	E.
*77.	*Ablabes longicaudus* (Ptrs.)	W.		
78.	*Ablabes periops* (Gthr.)	W.		
*79.	Ptyas korros (*Raw.*)	...	S. (Blkr.).	
80.	Compsosoma melanurum (*Schleg.*)	W.	...	E.
*81.	Compsosoma radiatum (*Raw.*)	W. (Blkr.).		
82.	Xenelaphis hexahonotus (*Cant.*) ‡	W.		
83.	*Zaocys fuscus* (Gthr.)	W.		
84.	*Zaocys carinatus* (Gthr.)	W.		
85.	Tropidonotus rhodomelas (*Boie*)	W.		
86.	Tropidonotus quincunciatus (*Schleg.*).			
87.	Tropidonotus maculatus (*Edeling*, 1865) §	W.	S.	
[? 88.	Tropidonotus stolatus (*L.*).]			
89.	Tropidonotus trianguligerus (*Raw.*)	W.	S.	
90.	*Tropidonotus flaviceps* (D. et B.) ‖	W.	S.	E.
91.	*Tropidonotus sarawacensis* (Gthr.) ¶	W.		
92.	*Tropidonotus conspicillatus* (Gthr.)	W.		
93.	Cerberus rhynchops (*Schneid.*)	W.	S.	
94.	*Cerberus acutus* (Gray).			
95.	Homalopsis buccata (*L.*)	W.	S.	
96.	*Pythonopsis punctata* (Gray) ††	W.		
*97.	*Homalophis doriæ* (Ptrs.)	W.		
98.	Hypsirhina plumbea (*Kuhl*)	W.	S.	
99.	Hypsirhina enhydris (*Schneid.*)	W.	S.	
100.	Fordonia unicolor (*Gray*)	W.	S.	
101.	Miralia alternans (*Reuss*) ‡‡.			
102.	Cyclophis tricolor (*Schleg.*) §§	W.	S.	
103.	Gonyosoma oxycephalum (*Raw.*)	W.	...	... N.
*104.	*Gonyosoma margaritatum* (Ptrs.)	W.		
105.	*Psammodynastes pictus* (Gthr.) ‖‖	W.	S.	
106.	Chrysopelea rubescens (*Gray*)	...	...	... N.
107.	Chrysopelea ornata (*Shaw*)	W.	...	... N.
108.	Dendrophis picta (*Gm.*)	W.	S.	E. N.
109.	Dendrophis caudolineata (*Gray*)	W.	S.	... N.
*110.	Dendrophis formosa (*Schleg.*)	...	S. (Blkr.).	
111.	Tragops prasinus (*Raw.*)	W.	S.	... N.
112.	Dipsas dendrophila (*Raw.*)	W.	S.	... N.
*113.	Dipsas cynodon (*Cuv.*).			

† = *Enicognathus javanicus*, Blkr. *l. c.* xvi. p. 437.

‡ = *Dendrophis dumerilii* (Blkr.), which is the adult, and = *Ablabes polyhemizona* (Blkr.), which is the young.

§ = *T. sundanensis* of Bleeker, who never gave a description of the species.

‖ = *T. leucomelas* (Gthr.), = *Amphiesma lindmanni* (Blkr.), = *A. rufotorquatum* (Edeling).

¶ = *T. maculatus*, Ptrs., nec Edeling.

†† Besides the typical example, the British Museum possesses a second from Sinkawang, the type of Bleeker's *Eurostus heteraspis* (*l. c.* xvi. p. 440). On comparing these examples with Prof. Peters's description of *Pythonopsis borneensis* (Berlin. Monatsber. 1871, p. 576), I come to the conclusion that they are the same species.

‡‡ = *Raclitia indica* (Gray), and = *Rhabdion borneensis* (Blkr.).

§§ = *Ablabes schlegelii* (Blkr.).

‖‖ An = *P. pulverulentus* (Blkr.), *l. c.* xx. p. 201?

114. *Dipsas boops* (Gthr.)	...	...	...	N.
*115. Dipsas multimaculata (*Boie*)	...	S. (Blkr.).		
116. Tetragonosoma effrene (*Cant.*)	W.			
117. Amblycephalus boa (*Kuhl*).				
*118. Pareas carinata (*Wagl.*), according to Bleeker	W.	S.	...	N.
119. Pareas lævis (*Kuhl*)	W.			
120. Python reticulatus (*Schn.*)	W.	S.	...	N.
121. Acrochordus javanicus (*Hornst.*)	...	S.		
122. Hamadryas elaps (*Schlcg.*)	W.			
*123. Bungarus annularis (*Daud.*)	W.			
124. Bungarus flaviceps (*Rnh.*)	W.	...	...	N.
125. Naja tripudians (*Merr.*)	W.	S.	...	N.
126. Callophis intestinalis (*Laur.*)†	W.	S.	E.	N.
127. Callophis bivirgatus (*Boie*)‡	W.			
128. Trimeresurus wagleri (*Schleg.*)	W.	...	...	N.
129. Pelamys bicolor (*Schn.*).				
130. Hydrophis brookii (*Gthr.*).				
131. Hydrophis loreata (*Gray*).				
132. Hydrophis schistosus (*Daud.*), according to Bleeker.				

Amphibians.

133. Epicrium glutinosum (*L.*)	W.			
134. Epicrium monochroum (*Blkr.*)	W.			
135. *Rana conspicillata* (Gthr.)	W.			
136. Rana gracilis (*Wiegm.*)	W.	...	...	N.
137. Rana tigrina (*Daud.*)	W.	S.	...	N.
138. *Leptobrachium gracile* (Gthr.)	W.			
139. Megalophrys montana (*Kuhl*)	W.	S.		
140. Calophrynus pleurostigma (*M. L.*)	...	S.		
*141. *Calophrynus punctatus* (Ptrs.)	W.			
142. Bufo melanostictus (*Schn.*)	W.	S.		
143. Bufo asper (*M. L.*)	W.	S.	...	N.
144. Bufo biporcatus (*M. L.*)	...	S.	...	N.
145. *Bufo divergens* (Ptrs.)	W.	...	...	N.
146. *Bufo leptopus* (Gthr.)	W.			
147. Pseudobufo subasper (*Tsch.*)	...	S.		
148. Hylorana erythræa (*Schlcg.*)	...	S.	...	N.
149. *Hylorana luctuosa* (Ptrs.)	W.			
150. *Hylorana jerboa* (Gthr.)	W.			
*151. *Ixalus pictus* (Ptrs.)	W.			
152. Polypedates quadrilineatus (*Wgm.*)	W.	...	...	N.
153. *Polypedates guttatus* (Gthr.)	W.			
154. *Polypedates signatus* (Gthr.)	W.			
*155. *Polypedates raniceps* (Ptrs.)	W.			
156. Rhacophorus pardalis (*Gthr.*).				
*157. *Calohyla sundana* (Ptrs.)	W.			

It would be premature to draw positive conclusions from this list with regard to the general character of the Reptilian fauna of Borneo, as well as to the relations of the local faunæ to one another. The area from which collections have been received is only about one eighth of the whole island, and not larger than Ceylon. From the latter we know about 120 species, of which 65 species and 12 genera are peculiar to the island. Of the 154 Bornean Reptiles, about 50 species and 8 genera have hitherto not been found else-

† In several varieties, one of which I consider to be *Adeniophis nigro-tæniatus* (Ptrs.).

‡ = *Elaps tetratænia*, Blkr. *l. c.* xx. p. 201.

where. It is, perhaps, worthy of notice that none of the poisonous Snakes are peculiar to the island; and, on the whole, we may say that this part of its fauna, so far as it is known at present, does not essentially differ from that of the other large Malasian islands.

I proceed now to the description of some species which appear to be new; and I take this opportunity of noticing a few additional species from other parts of the East-Indian archipelago.

DRACO CRISTATELLUS. (Plate XXXV. fig. A.)

The length of the hind limb equals the distance between the axils of the limbs. Nostrils lateral, obliquely directed upwards and outwards. Male with a slight nuchal crest in the form of a low fold. Tail crested, the crest being formed by rather distant, triangular, pointed scales. Scales small, those on the back smooth, without scattered larger ones; abdominal scales keeled. Orbit without prominence above. Tympanum nearly entirely scaly. Upper parts light chestnut-brown, with irregular transverse black markings. Gular sac golden-yellow, with a brown anterior edge. Lower side of the wings nearly uniform whitish, with only a few blackish spots along its anterior margin.

One adult male from Sarawak.

DRACO SPILOPTERUS. (Plate XXXV. fig. B.)

The length of the hind limb equals the distance between the axils of the limbs. Nostrils lateral, directed outwards. No crest. Scales small, those on the back smooth, without scattered larger ones, all much smaller than the upper labial shields; abdominal scales keeled. Orbit without prominence. Tympanum distinct. Upper parts marbled with brown; sides of the neck reticulated; wings yellowish white, with small black spots on their basal half, which are visible on the upperside of the wings as well as on the lower.

Two specimens from Manado.

TIARIS LIOGASTER. (Plate XXXVI.)

Dorsal crest continuous, very high in the adult, disappearing on the front part of the tail. Sides with irregularly scattered larger scales. Scales of the median line of the gular pouch not conspicuously different from those on the side of the pouch. Abdominal scales of moderate size, smooth, or with a very faint keel. The middle of the upper arm surrounded by about seventeen or eighteen longitudinal series of scales. Tympanum as large as the eye. Throat with black spots, more or less distinctly arranged in oblique series converging towards the median line of the pouch.

Three adult, one half-grown, and one young specimen from Sarawak.

TIARIS MIOTYMPANUM. (Plate XXXVII. fig. B.)

Dorsal crest continuous, high in the adult, rather abruptly terminating on the root of the tail. Sides with a series of larger scales along each side of the back; no other scattered large scales on the side. Scales of the median line of the gular pouch not conspicuously

different from those on the side of the pouch. Abdominal scales small, very obtusely keeled. The middle of the upper arm surrounded by about twenty-four longitudinal series of scales. Tympanum very distinct, but small, about one third of the size of the eye. Throat apparently without spots.

Two adult specimens from Labuan.

TIARIS SOPHIÆ. (Plate XXXVII. fig. C.)

Tiaris bellii, Gray, Lizards, p. 239 (not D. & B.).
Tiaris sophiæ, Gray, Lizards, p. 240.
Tiaris petersii, Günth. Zool. Record, ii. p. 136.

Dorsal crest continuous, high in the adult, disappearing on the front part of the tail. Sides with irregularly scattered larger scales. In the adult male the scales of the median line of the gular pouch enlarged and provided with a strong keel, which terminates in a prominent spine. Abdominal scales rather small, strongly keeled. The middle of the upper arm surrounded by about twenty longitudinal series of scales. Tympanum very distinct, smaller than the eye. Throat without, or with rather indistinct, oblique blackish lines.

Two adult, two half-grown, and two young specimens from the Philippine Islands.

TIARIS TUBERCULATUS. (Plate XXXVIII.)

Agrees with *Tiaris dilophus* in habit, structure of the dorsal crest, scattered larger scales on the sides, &c. But the scales generally are considerably larger, especially on the tail, limbs, and gular pouch, and provided with very faint keels only. The scales along the upper edge of the tail form rather a serrature than a crest. A large round conical scale below the tympanum, on the angle of the lower jaw.

One adult specimen from the East-Indian archipelago.

LOPHOCALOTES.

This genus differs from *Calotes* in the structure of the crest, which is interrupted on the neck, and formed by distant spines on the back.

LOPHOCALOTES INTERRUPTUS. (Plate XXXVII. fig. A.)

Head without spines; but there is a larger scale, conically raised, on each side of the neck, midway between the tympanum and commencement of the nuchal crest. A series of three enlarged scutes between the eye and tympanum. Dorsal crest moderately high, composed of close-set lanceolate spines on the neck, interrupted above the shoulder, and formed by about fourteen triangular spines on the trunk, only every alternate median scale being modified into a spine. No fold in front of the shoulder. Scales in the median line of the throat much smaller than those on the sides. About thirty-four series of scales round the middle of the body, those of the belly much smaller than those on the sides. The keels of some scales on the limbs terminate in prominent spines. Green, with rather irregular yellowish markings, especially on the head. A yel-

lowish cross bar between the shoulders; limbs with narrow yellowish rings.

One specimen from the East-Indian archipelago is 10 inches long, tail $6\frac{1}{3}$ inches.

PERIPIA MEYERI.

I may mention that *Peripia cantoris* (Gthr. 1864) is identical with *Hemidactylus meyeri* from Bintang (Bleeker, 1859, Nat. Tyds. Ned. Ind. xvi. p. 47). We have also specimens from the Feejee Islands.

SPATHODACTYLUS.

Only the extremity of the penultimate joint of the toes is dilated, shovel-like, and provided below with two divergent series of a few transverse plates; the last joint is short, but free and armed with a claw. The thumb and fifth toe are reduced to a mere clawless rudiment. Eyelids none. Skin uniformly granular. An angular series of larger scales in the præanal region is continued on the thigh.

Fig. 1.



Fig. 2.



SPATHODACTYLUS MUTILATUS. (Figs. 1 & 2.)

Habit rather slender, with short limbs. Ear-opening small. The first pair of lower labials do not unite behind the median shield; no other chin-shields. Brown, finely marbled with darker; a series of round whitish spots commences behind the eye, and is continued along each side of the back to the tail. Lower parts whitish, finely speckled with brown.

One specimen from the East-Indian archipelago is $3\frac{1}{4}$ inches long, the tail being $1\frac{1}{2}$ inch.

CALAMARIA GRACILLIMA. (Plate XXXIX. fig. A.)

Body exceedingly slender, head very small, tail very short, terminating in a very obtuse point. Eye minute. The nostril does not appear to be placed in a separate shield; it is in the suture between the first labial and frontal, on each side of the rostral. Four upper labial shields; the frontals diverging behind; vertical rhombic, broader than long, with an obtuse angle in front and behind, the lateral angles being somewhat pointed. Occipitals rounded behind, longer than broad. If orbital shields are present, they must be exceedingly small. The first pair of lower labials are in contact with each other.

The circumference of the body is one twenty-second of the total length. *Ventral shields three hundred and twenty*; anal entire, subcaudals thirteen. Scales in thirteen rows. Uniform black; on each side of the body a series of round white spots, the first being behind the angle of the mouth, and the last on the very end of the tail.

This singular Snake differs in so many respects from the typical *Calamariæ* that it may be regarded as the type of a distinct genus, to which the name of *Typhlocalamus* may be given. Unfortunately the head of the single example has been allowed to dry, and is somewhat shrunk; but it is almost certain that there is no nasal shield.

The single specimen from Sarawak is 11 inches long, the head being $2\frac{1}{6}$ lines, and the tail $4\frac{1}{2}$ lines.

SIMOTES SUBCARINATUS. (Plate XXXIX. fig. B.)

Allied to *S. signatus*.

Scales in seventeen rows, *minutely striated, and with an obtuse median ridge, like a keel*; these ridges are more apparent on the hinder part of the body than on the anterior. Loreal none, confluent with posterior frontal, the lower angle of which is in contact with the second and third labials; one præ-, one postocular; seven upper labials, the third and fourth entering the orbit; temporals 1+1+2. Anterior chin-shields twice as long as broad, and twice as large as posterior, in contact with four labials. Ventral shields 158; anal entire; subcaudals 54. Ventrals without keels. Greyish olive, with numerous narrow, straight, white, dark-edged cross bars; they are placed at rather irregular intervals, some reaching right across the back and sides, others being much shorter. Head with the markings usual in this genus. Abdomen white, with some darker spots along each side.

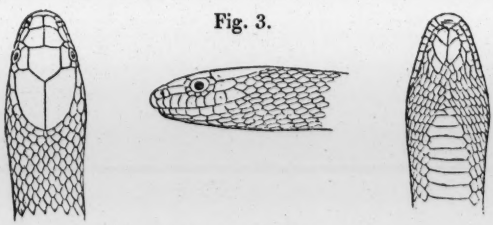
One specimen from Sarawak is 15 inches long, tail $3\frac{1}{4}$ inches.

ABLABES PERIOPS. (Fig. 3.)

Eye surrounded by a ring of small scales.

Scales in seventeen rows, short, rounded, without apical groove. Rostral shield broader than high, just reaching the upper surface

Fig. 3.



of the head; anterior frontals about half as large as posterior, broader than long; vertical five-sided, with a right angle behind,

and with the supraciliary edges parallel and rather shorter than the anterior; occipitals rounded behind, nearly as long as vertical and frontals together; nasal shield entirely divided; loreal longer than high; eye rather small, surrounded by six or seven scale-like shields, besides the supraciliary. Upper labials nine, all small. Temporals 1+2+2; three pairs of chin-shields, the middle the largest. Ventrals 209; anal bifid; subcaudals sixty-two. Olive-brown; a yellowish line proceeds from each temple, along the side of the back, and soon disappears; the three outer series of scales black. Abdomen whitish, each ventral shield blackish on the front margin; lower side of the head and tail black.

Two specimens from Matang, the larger of which is $15\frac{2}{3}$ inches long, tail $2\frac{2}{3}$ inches.

TROPIDONOTUS SARAWACENSIS.

Tropidonotus maculatus, Peters, Berl. Monatsber. 1871, p. 575.

The name proposed by Professor Peters cannot be retained, because it has been used by Edeling, in 1865, for another Bornean species.

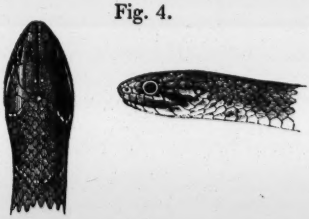
We possess three specimens from Matang, which differ in some respects from the description given by Professor Peters: the scales are in seventeen rows only; eight upper labials, the third, fourth, and fifth entering the orbit.

The shape of the head and the large square spots on the abdomen are characteristic of this species.

TROPIDONOTUS CONSPICILLATUS. (Fig. 4.)

Body of moderate length; head small, short, depressed; eye of moderate size. Scales in nineteen rows, all keeled. Ventrals 140; anal bifid; subcaudals fifty. Anterior frontals obtusely rounded in front; loreal square; one præocular, just reaching to the upper

Fig. 4.



surface of the head; three postoculars; eight upper labials, the third, fourth, and fifth entering the orbit; temporals 1 + 3 or 2. The last maxillary tooth is much larger than the preceding, but separated from it by a very slight interval only. Brown, with a network of indistinct darker spots, and with a series of short yellow vertical bars along each side. An oblique yellow black-edged band from the eye

to the angle of the mouth; neck with a large rhombic blackish spot edged with yellow in front and behind; lower parts whitish, each ventral scute with a brownish line across the front margin. These dark lines become broader on the posterior half of the body, the subcaudals being marbled with brown.

Three specimens from Matang, the largest of which is 16 inches long and appears to be adult, the length of the tail being 3 inches.

HYDROPHIS BROOKII. (Fig. 5.)

Allied to *Hydrophis carinata*.

Head very small, not quite twice as long as broad; neck very slender, its length being one third of the total. One postocular; the third upper labial is not in contact with the nasal. Two pairs

Fig. 5.



of chin-shields, which are in contact with each other. Thirty-one series of scales round the neck. Scales rather imbricate, those on the back and sides with a short keel. Ventral shields 416, those of the attenuated portion very distinct, and twice as large as the scales of the adjoining series, the posterior being of comparatively smaller size. Four anal shields. Trunk with sixty-three complete black rings, which are broader than the interspaces of the yellowish ground-colour, and not much broader on the back than on the belly. Head and lower side of the foremost part of the trunk black; the former with a yellow horseshoe-shaped mark across the frontals and nasals, and extending backwards over the supraciliary edge to the temple. Tail with eight black rings.

One adult female from the coast of Sarawak is 36 inches long; the fœtuses in the oviduct are fully developed, and resemble the parent in every respect. This shows that the species of *Hydrophis* are subject to much less variation than was formerly supposed.

RANA CONSPICILLATA. (Plate XL. fig. A.)

Snout rather short, depressed, somewhat obtuse, with very indistinct canthus rostralis and with the sides sloping; loreal region grooved. Eyes of moderate size. *Tympanum entirely hidden.* Lower jaw with a pair of very prominent but not pointed apophyses in front, which are much stronger in the male than in the female

and young. Vomerine teeth in two oblique series converging behind and commencing from between the inner nostrils. Inner nostrils and Eustachian tubes rather narrow. Skin of adult examples smooth, except the lower leg and the foot, which are more or less covered with tuberosities; in some young examples also the sides are tubercular. Hind limbs thick and short, the distance between the vent and heel being but little less than the length of the body. Tips of the fingers and toes swollen, those of the latter more so than those of the former; toes completely webbed, a cutaneous fringe along the outside of the first and fifth toes; a narrow fringe along the inner metatarsal edge, including a single elongate tubercle. An oblique black band descends from behind the eye towards the shoulder. Upper parts blackish or blackish brown, sometimes marbled with darker on the sides and legs; adult females with a yellow vertebral band from the snout to the vent. Lower parts whitish, throat finely marbled with brown. There is no light band between the eyes.

Of this species we have specimens of the different sexes and ages from Matang. An adult male is 3 inches long, the length of the hind leg being $4\frac{1}{4}$ inches.

Like *Rana kuhlii* and the Javan *R. macrodon*, to which this species is allied, it lacks a gular sac or sublingual openings.

LEPTOBRACHIUM GRACILE.

Similar to *Leptobrachium hasseltii*, but with much more slender limbs.

Snout not depressed, as long as the eye, with distinct canthus rostralis, and with the loreal region but slightly shelving. Eye large, prominent; tympanum distinct, with a curved linear fold above; inner nostrils much narrower than the Eustachian tubes; tongue very large, filling the entire cavity of the mouth, notched behind. Skin perfectly smooth. Third finger considerably longer than the others. The length of the body is but little more than the distance between the vent and heel. Metatarsus without tubercle; toes connected by a very short basal membrane. Upper parts greyish olive; a whitish spot below the eye, upper arm and elbow whitish; hind limb with blackish cross bars, lower and lateral parts of the body and hind limb with rather large irregular black spots.

One specimen from Matang.

	millims.
Total length	42
Fore limb	33
Third finger	10
Hind limb	75
Tarsus	13
Fourth toe	17

BUFO LEPTOPUS.

Allied to *Bufo cruentatus* (= *Hylaplesia borbonica*, Boie) and *Hylaplesia brevipes* (Ptrs.), from which latter species it is distinguished principally by the presence of two metatarsal tubercles.

In general habit it resembles much the two species named. All the upper and lateral parts are covered by small warts and tubercles, *which on the side of the neck do not form a parotoid.* Tympanum distinct, one fourth of the size of the eye. Legs very slender, and comparatively more so in adult examples than in young ones. The fore leg extends beyond the vent when laid backwards, and the heel to the end of the snout when the hind leg is laid forwards. In a young example the heel extends only to the tympanum. The young differs from the old also with regard to the development of the web, length and termination of the toes. In an old example the fingers and toes are very slender, slightly swollen at the tip; the former are quite free, and the latter connected by a basal membrane only; whilst in the young the fingers and toes are short, dilated, with the extremity truncated*; and the former are connected by a short, the latter by a very distinct web. *Two flat callosities on the metatarsus.* Brown above, marbled with reddish or with black dots; throat and chest with blackish spots, or entirely black.

Two examples from Matang; the measurements are as follows:—

	Adult. millims.	Young. millims.
Total length	54	30
Fore leg	45	25
Lower arm	17	7
First finger	7	2½
Third finger	13	6
Hind limb	85	39
Lower leg	27	12
Tarsus	17	7½
Fourth toe	19	9
First toe	4	2½

HYLORANA JERBOA. (Plate XL. fig. B.)

Hind limbs extraordinarily long, their length being twice and a half as long as that of the body. Shape of the body similar to that of *Hylorana erythræa*; canthus rostralis sharp, loreal region subvertical and grooved; eye shorter than the snout, but larger than the tympanum. Disks of the fingers and toes moderately developed; fingers slender; toes completely webbed, the length of the fourth being three fifths of that of the body. Metatarsus with two small tubercles. Skin of the back finely granular; a glandular fold along each side of the back. Lower parts smooth. Inner nostrils of moderate width, Eustachian tubes rather larger. Vomerine teeth in two oblique series, converging posteriorly, between the inner nostrils. Upperside of the head and back red, side of the body and head black, upper lip and glandular folds greenish white, legs marbled with brown; lower side of the foot and tarsus black; abdomen whitish.

One specimen from Matang; its body is 2 inches long. Length of the hind limb 5 inches, distance between vent and heel 2¾ inches.

* The typical specimens of *Hylaplesia brevipes* are evidently young, and show similar peculiarities.

POLYPEDATES GUTTATUS (Gthr.).

Having received two other specimens of *Ixalus guttatus*, I see that the typical specimen is not full grown, being only 30 mm. long. No trace of vomerine teeth are visible in it; whilst two short tooth-bearing ridges obliquely diverging backwards are present between the inner nostrils of the old specimens. The body of the latter is 47 mm. long. *Polypedates raniceps* appears to be closely allied to this species, but to have a larger tympanum.

POLYPEDATES SIGNATUS. (Plate XL. fig. C.)

Somewhat similar in habit to *Polypedates guttatus*, but with the snout shorter; canthus rostralis distinct, loreal region vertical, concave; eye large; tympanum about one half the size of the eye. Back and sides granular, lower parts smooth. Fingers very slender, quite free, *with very small disks*; toes slender, two thirds webbed, with small disks; two small metatarsal tubercles. Inner nostrils narrow, narrower than the Eustachian tubes; vomerine teeth in two oblique converging series between the inner nostrils. Upper parts black; a light olive band runs along the upper margin of the snout and eyelid, and along each side of the back, the back itself being spotted with reddish olive, as are the sides; upper parts of the legs with black cross bands; lower parts whitish.

One specimen from Matang.

	millims.
Total length	40
Fore limb	30
Third toe	9
Hind limb	73
Tarsus	11
Fourth toe	20

DESCRIPTION OF THE PLATES.

PLATE XXXV.

Fig. A. *Draco cristatellus*, p. 592. | Fig. B. *Draco spilopterus*, p. 592.

PLATE XXXVI.

Tiaris liogaster, p. 592.

PLATE XXXVII.

Fig. A. *Lophocalotes interruptus*, p. 593. | Fig. C. *Tiaris sophiæ*, p. 593.
B. *Tiaris miotympanum*, p. 592.

PLATE XXXVIII.

Tiaris tuberculatus, p. 593.

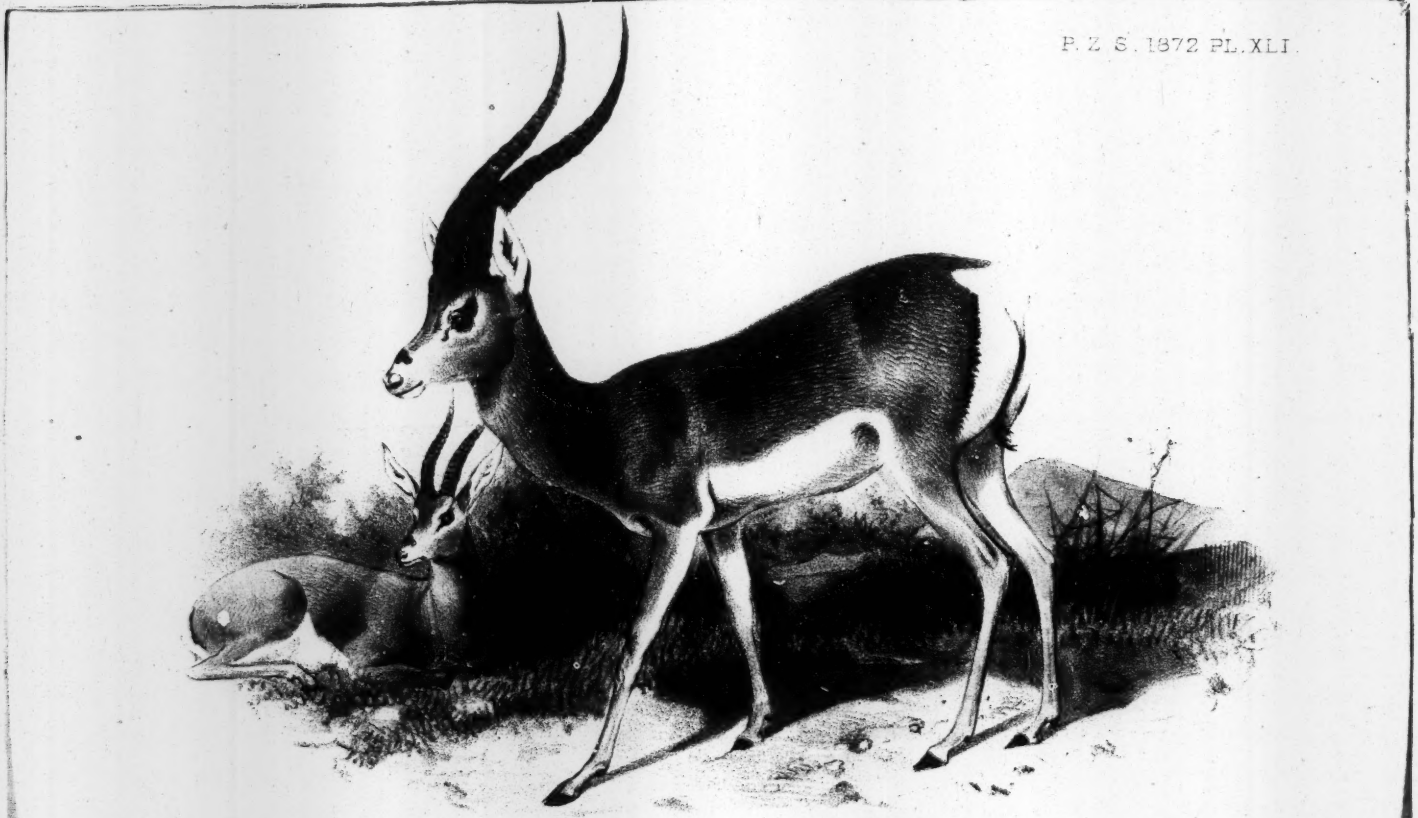
PLATE XXXIX.

Fig. A. *Calamaria gracillima*, p. 594. | Fig. B. *Simotes subcarinatus*, p. 595.

PLATE XL.

Fig. A. *Rana conspillata*, p. 597. | Fig. C. *Polypedates signatus*, p. 600.
B. *Hylorana jerboa*, p. 599.

BROOKLYN PUBLIC LIBRARY



J. Smit. lith.

M&N Hanhart imp.

GAZELLA GRANTI.

8. On a supposed new Species of Gazelle from Eastern Africa. By Sir Victor Brooke, Bart., F.Z.S.

(Plate XLI.)

During their celebrated expedition in search of the Nile sources, Capts. Speke and Grant, in the November of 1860, whilst passing through Ugogo, obtained three specimens of a Gazelle entirely strange to them. Meeting a down caravan at Kazeh, they dispatched these, along with some other specimens of natural history, accompanied by a letter to Dr. Sclater, intending them to be deposited in the rooms of this Society until their return. The letter arrived safely, and is published in the Society's 'Proceedings' for 1863, p. 1; but the box containing the specimens was, as is too often the case, lost, probably never having reached Zanzibar. In this letter Captain Speke sends a rough outline of the head and horns of the Ugogo Gazelle, placing his short notice of it, with evidently great doubt, under the name of *Antilope sœmmeringii*. To this notice, at page 4, Dr. Sclater appends a footnote, expressing his conviction of the species being a new one, an opinion in which Dr. Gray agreed.

Again, in his 'Journal,' at page 64, Captain Speke gives an excellent woodcut of what he there calls the "new Antelope from Ugogo." In the text he compares it in size to the common Indian Antelope, in colour to the little Goa (*Gazella picticauda*) of Thibet, excepting as regards the presence of dark markings on the face of the Ugogo Antelope.

I have long been of the opinion that this species is an exceedingly distinct and undescribed one, and was therefore much pleased when, upon mentioning the Antelope to Colonel Grant a short time ago, he informed me that he and Captain Speke had at the time made very careful sketches of their heads and skins, being greatly struck with their novelty. An examination of these water-colour drawings has confirmed me in my opinion. The species evidently belongs to the section of large, long-limbed Gazelles of which *Gazella dama*, *G. mohr*, *G. euchore*, and *G. sœmmerringii* are the representatives. It, however, differs very decidedly from any of these species both in the details of its markings (the general ground-colour of the desert Gazelles being much the same in many species), but especially in the great length, massiveness, and form of the horns. These ornamental appendages, according to the dimensions given by Capt. Speke and Col. Grant, attain an extraordinary development in the Ugogo species, the horns of the male measuring 26 inches in length, those of the female 15 inches. These dimensions are nearly double those attained by any Gazelle with which I am acquainted. In direction the horns of the Ugogo Gazelle depart widely from the lyrate form so typical of this group; they greatly resemble, on a very large scale, those of the *Gazella bennettii* of India, being apparently much compressed from side to side, rising with a gentle inclination forwards from their base, then curving backwards at about half their length, and then

again forwards towards their tips, the distance between the horns gradually increasing from base to tip. Well-marked annulations surround the horns for three fourths of their length.

The colour of the cheeks, neck, back, and sides appears to be the isabelline sandy fawn-colour characteristic of many desert forms. Inside of ears, belly, and a patch on the rump, crossing above the tail and running in a point over the ischium into the fawn-colour, white, a black streak lining this patch on each haunch between the white and fawn colours. Spot on nose, above and below the eyes, and tail black.

Col. Grant, who has most kindly supplied me with copious extracts from his note-books, informs me that this Antelope was only met with in Western Kinyenye, in Ugogo; the country inhabited by it he describes as low-lying sandy plains dotted over in some places with euphorbias, dwarf acacias, and stunted baobabs. The chief peculiarity of the country, owing doubtless to its comparatively low level, is the great accumulation of salt, which has of course a marked effect on the vegetation. Water at all times of the year is very scarce, generally entirely absent, the little there is being brackish and undrinkable. As there already exists a Gazelle bearing the name of Capt. Speke* I would propose to name the Ugogo species *Gazella granti*, after his gallant fellow traveller, and trust that before long I may receive specimens to exhibit before the Society, having sent sketches of the head and horns to Lieut. Henn of the Livingstone-search expedition and to Dr. Kirk.

The following are the measurements afforded by Captain Speke and Col. Grant's note-books, compared with similar measurements of an adult male *Gazella sœmmerringii* at present living in the Society's Menagerie:—

	Gazella granti ♂.	*G. granti* ♀.	*G. sœmmerringii* ♂.
Length of horn along curve	26″	15″	13½″
Circumference at base.....	7¼	3½	5½
Length of face.....	8	8	7¼
Round the head behind the horns ..	19	16	16½

May 7, 1872.

Prof. Newton, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of March 1872:—

The total number of registered additions to the Society's Menagerie during the month of March 1872 was 122, of which 6 were by birth, 45 by presentation, 58 by purchase, 8 by exchange, and 5 were received on deposit. The total number of departures during the same

* Blyth, Journal of the Asiatic Soc. of Bengal, vol. xxiv. p. 296.

period by death and removals was 121, showing a net addition of one individual to the collection during the month.

The most noticeable additions were the following:—

1. A Pheasant Coucal (*Centropus phasianus**) from Australia, purchased March 5th, being the first example of this fine species received by the Society.

2. Two Grey Struthideas (*Struthidea cinerea*, Gould) from Australia, received in exchange March 9th. The genus *Struthidea* is a very obscure form of the Passerine Order, the correct position of which is quite uncertain. We may hope that the receipt of these birds, which have never previously reached England alive, will ultimately serve to make us better acquainted with their organization.

3. Five Knob-nosed Lizards, *Lyriocephalus scutatus* (Linn.), from Ceylon, presented by H. N. Mosely, Esq., March 11th, likewise new to the Society's collection.

4. Two specimens of a fine large Red-necked Bustard of the genus *Eupodotis*, from the vicinity of Cape-coast Castle, West Africa, presented, the one by Mr. C. D. O'Connor, the other by H. E. Governor Ussher, March 20th. These birds appear to be referable to *Eupodotis denhami* (*Otis denhami*, Children, App. to Denham's Travels, p. 199); but whether this species is really distinct from the southern *E. caffra*, sive *ruficollis*, I am not at present able to say.

5. On March 20th Mr. A. T. Wise presented to us three small Water-Tortoises of the genus *Clemmys*, which, as he informs me, were procured at Gibraltar, and are of the ordinary species of Southern Spain. On examining these I convinced myself that they were referable to the ordinary *Clemmys leprosa* (*cf.* Strauch, Chelon. St. p. 122) of Southern Europe. But I was much surprised to find on further examination that one of the surviving specimens of *Emys flavipes* of Dr. Gray (P. Z. S. 1869, p. 643, pl. 50) belonged apparently to the same species; and after further examination I have come to the conclusion that the so-called *Emys flavipes* is merely a synonym of *Clemmys leprosa*.

6. A Crested Screamer (*Chauna chavaria*) presented March 22th by Arthur C. Maxwell, Esq., being, as I believe, the first example of this species ever received by the Society, although we have had several specimens of the allied *C. derbiana*.

7. A second specimen of *Chauna chavaria*, presented March 25th by Higford Burr, Esq.

8. A Beatrix Antelope (*Oryx beatrix*), deposited March 26th by Mr. Gwyn Jeffreys, F.R.S., F.Z.S., being the survivor of a pair of these animals obtained for Mr. Gwyn Jeffreys by Col. Pelly, H.B.M. Resident at Bushire. The receipt of this animal is of very great scientific interest, as confirming the species established by Dr. Gray (P. Z. S. 1857, p. 157, Mamm. pl. 54) upon an Antelope formerly living in this Society's gardens, and further, as indicating its correct locality, which was previously doubtful. Our present example seems to agree in nearly every respect with Mr. Wolf's figure of the former specimen, and in the distinctions pointed out in Dr. Gray's description.

* *Centropus phasianus* (Lath.): Gould, B. of Austr. iv. pl. 92.

There appear, therefore, to be four well-marked species of this genus of Antelopes, each inhabiting a distinct area, namely:—

1. *O. beatrix*, of Arabia.
2. *O. beisa*, of the eastern shores of the Red Sea.
3. *O. leucoryx*, of Eastern and Western Africa.
4. *O. gazella*, of Southern Africa.

9. A small Penguin captured at Guaycan, in Northern Chili, by one of the Pacific Mail Steamers, and presented to the Society by Major T. G. Sandemann, F. Z. S. This bird I have little hesitation in referring to Humboldt's Penguin (*Spheniscus humboldti*), although it appears to be not quite adult. It is, however, very nearly similar to an example of the same species now in the Society's gardens, which was deposited by Lord Londesborough, F.Z.S., on the 6th of December, 1871.

Mr. Sclater exhibited the skull of one of the specimens of the Hairy Tapir of the Andes (*Tapirus roulini*) *, obtained by Mr. Buckley during his recent expedition to Ecuador, and kindly lent to Mr. Sclater by Mr. E. Gerrard, Junior. Mr. Sclater also exhibited for comparison a skull of *Tapirus terrestris* of about the same age, *i. e.* with the fourth upper molars not yet *in situ*, and pointed out the most obvious differences that distinguish the skulls of the two species.

These were, first, the different form of the nasal bones, which in *T.*

Fig. 1. Fig. 2.

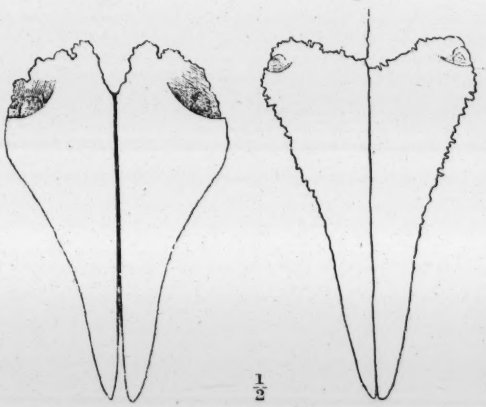


Fig. 1. Outline of nasal bones of *Tapirus terrestris*, reduced ½.
Fig. 2. Corresponding bones of *Tapirus roulini*.

---

* *Cf.* former note on this species, P. Z. S. 1870, p. 51.

roulini are longer, narrow more gradually towards their extremities, and are more arched (see figs. 1 and 2); and, secondly, in the much less elevation of the cranial crest in *T. roulini*, the upper surface of this ridge being continued in nearly the same horizontal plane as that of the nasal bones, instead of forming a considerable angle with it. Besides these points, the fronto-nasal suture was nearly straight in *T. roulini*, instead of being deflected forwards between the two nasals as in *T. americanus*, and the deep grooves at each side of the nasal bones were broader in *T. roulini* than in *T. americanus*.

A communication was read from Viscount Walden, F.R.S., President of the Society, containing an Appendix to his paper on the Birds of Celebes, read at the meeting held on the 2nd of May, 1871.

The first portion of this communication contained additional observations upon the species contained in the former list.

The second portion contained a list of twelve additional species, with remarks upon them, thus raising the total number of authentically recorded Celebean birds to 205.

This paper will be published in full in the Society's 'Transactions.'

Prof. Owen read the eighteenth of his series of memoirs on the extinct birds of the genus *Dinornis*, in which the characters of a supposed new species of *Dinornis*, from the south island of New Zealand, allied to *D. crassus*, were pointed out, and the species was proposed to be called *Dinornis gravis*. To this was added a *résumé* of the described species of *Dinornis*.

This memoir will be published entire in the Society's 'Transactions.'

Mr. H. E. Dresser exhibited eggs of the Marbled Duck (*Querquedula marmorata*), lately obtained by Major Howard Irby near Seville.

The following papers were read:—

1. On the Habits of the Swallows of the Genus *Progne** met with in the Argentine Republic. By W. H. Hudson, C.M.Z.S. With Notes by P. L. Sclater.

[Received March 1, 1872.]

Before leaving Buenos Ayres last summer I had begun to write about our Swallows, and in the present communication will speak of

* After examining a considerable series of skins of birds of this genus from various parts of America, I have come to the conclusion that there are only four well-marked forms which merit specific rank, namely:—

1. *Progne purpurea* (Linn.).

Under this head I include all the American "Purple Swallows," of which

the three species of *Progne* found in this country. The *Progne chalybea*, a handsome bird, the largest of its tribe in this neighbourhood, is worthy of the specific name *domestica* given to it by some authors, being preeminently domestic in its habits. It never breeds in banks as *Progne purpurea* often does, or in the forsaken domed nests of other birds in trees, a situation frequently resorted to by the *Hirundo leucorrhoa*, but is so accustomed to the companionship of man as to make its home in populous towns as well as in the country habitations. It makes its appearance here about the middle of September, and apparently resorts to the same breeding-place every year. It is a familiar, noisy, and, in the season of courtship, a pugnacious bird, very common, though not so numerous as the smaller species, which disputes with it the right to the breeding-chinks and holes beneath the eaves. The nest is roughly constructed of dry grass, hair, feathers, and other materials; the eggs white, pointed, and five in number. When the entrance to its building-hole is too large it partially closes it up with mud mixed with straw; if there be two entrances it closes one altogether. It is thus very seldom that this bird requires to use mud in building; and it is the only one of our Hirundines that uses such a material at all. When quitting its nest or on a person's approach, this Swallow utters an exceedingly loud startled cry, several times repeated. It also has a song composed of several agreeably modulated notes, and pitched in that thick rolling intonation which is peculiar to many of the Swallows. This song sounds but low when the bird is close at hand, and yet may sometimes be distinctly heard when the songster appears but a speck in the distance. It is one of the pleasantest songs that heralds our summer, though it is perhaps rendered more so from associations than from intrinsic sentences or melody. The favourite resort of old and young birds when the

---

Prof. Baird, in his 'Review of North American Birds,' p. 273 *et seq.*, makes several species (*P. subis*, *P. elegans*, *P. cryptoleuca*, and *P. furcata*). This species extends from the United States down to the Rio Negro. It is not, however, I believe, found on the western side of the Andes southwards of Ecuador, *Progne furcata* of Baird, described from Chili, having been probably received from Mendoza (*cf.* Philippi et Landb. Cat. Aves Chilenas, p. 88), whence I have also received specimens.

2. *Progne chalybea* (Gm.).

This species ranges from Mexico down to Buenos Ayres. I have skins in my collection from these extremes and many intermediate localities, and am not able to distinguish them. I have hitherto usually employed Baird's name *leucogastra* for it. It is the *Golondrina domestica* of Azara, undè *Hirundo domestica*, Vieillot.

3. *Progne dominicensis* (Gm.), of the Antilles, of which the adult male has a blue-black throat like the back. See Baird, Rev. A. B. p. 279.

4. *Progne tapera* (Linn.).

Of this species I have skins from Bogota, Puerto Cabello, Brazil, and Buenos Ayres; so that it likewise has an extensive range. I include under this head *Phæoprogne fusca* and *P. tapera* of Baird.

I have in some cases altered Mr. Hudson's scientific names (taken from former papers of myself and Mr. Salvin) to suit this nomenclature.—P. L. S.

breeding-season is over is to the broad leafy tops of an old ombée tree; and it is usually on these trees that they congregate, in parties of from twenty to a hundred, before leaving us in February.

If the species comprised in each genus or subgenus always resembled each other as closely as the *P. chalybea* and *P. purpurea*, it would be an easy thing indeed to classify; for I am not acquainted with any two distinct species more nearly resembling each other than these birds. The difference in the hue of the under-plumage and a divergence in one of the breeding-habits separates them; otherwise they are identical. Several times I had seen the *P. purpurea* in Buenos Ayres, usually a single individual seen after midsummer, associating with parties of the *P. chalybea*, and in size, language, and flight so exactly like it, that I, not knowing the bird, was almost inclined to think it a rare variety.

On arriving at Bahia Blanca last summer I found the *P. purpurea* quite numerous there, and the only large Swallow in that region, the range of the other species of *Progne* not extending so far south. Again, at Carmen de Patagones I observed great numbers of them. They arrive there late in September, and leave before the middle of February, breed under the eaves of houses or in walls, and build a nest like that of the *P. elegans*. But numbers also breed in the holes in the steep clay- and sand-banks of the Rio Negro. Judging from the appearance of all the breeding-places I examined, I am of opinion that they never excavate holes for themselves, but merely take possession of old forsaken burrows of quadrupeds and of the Burrowing Parrot (*Conurus patachonicus*). I have remarked that the two species described are identical in language; the loud shrill excited scream when the nest is approached, the various other short notes when the bird sweeps about the air, and the pleasingly modulated and leisurely uttered song are all possessed by the two species without the slightest difference in strength or intonation. This circumstance appears very remarkable to me, because, though two distinct species do sometimes possess one or more notes alike, the greater part of the language will always be found different, and also because I have noticed that individuals of one species in different localities do vary more in language than in any other particular.

In widely separated districts on the Pampas I have observed a considerable difference in the notes of birds of the same species, particularly in the songs of song-birds. I paid great attention to this matter while in Patagonia, and in several species common to that region and to Buenos Ayres found so great a difference in voice, that I was fully convinced that birds have a greater tendency to vary in language than in any thing else. It is, however, worthy of remark that it is in resident species only that I have noticed this tendency to vary; the language of a passage-bird seems everywhere the same. I may at another time have more to say on this subject.

The third species, *Progne tapera*, is more slender, and has a greater extent of wing than the two birds described; and instead of the beautiful steel-blue (their prevailing colour), his entire upper plumage is dull dusky brown, the under white. But if these differences

of hue and structure merely serve to show that he is not a very near relation of the two preceding species, those exhibited in his habits remove him very far indeed from them. *Progne tapera* is a very garrulous bird, and is no sooner arrived early in September than we are apprised of the circumstance by the notes which the male and female incessantly sing in concert, fluttering and waving their wings the while, and seeming quite beside themselves with joy at their safe arrival. Their language is more varied, the intonation bolder and freer than that of our other Swallows; the length of the notes can be varied at pleasure; some are almost harsh, others silvery or liquid, as of trickling drops: they all have a glad sound; and many possess that remarkable characteristic of shaping themselves into words or, rather, a fancied resemblance to words.

The *P. tapera* seldom or never alights on the ground or on the roofs of houses, but solely on trees. It breeds only in the *ovens* of the Oven-bird (*Furnarius*); I, at least, have never seen a pair breed in any other situation, after having observed them every summer of my life. An extraordinary habit! for, many as are the species possessing the parasitical tendency of fixing on other birds' nests to breed in, none of them confine themselves to the nest of a single species, except the bird I am describing. So soon as these Swallows arrive, each pair takes up its position on some tree, and usually on a particular branch; a dead twig extending beyond the foliage is a favourite perch. Here they spend much of their time, never appearing to remain long absent from it, and often, when singing their notes together, fluttering about it with a tremulous uncertain flight like that of a hovering butterfly. Twenty or thirty days after their arrival they begin to make advances towards the oven that stands on the nearest post or tree; and if it be still occupied by the builders or rightful owners, after much time being spent in sporting about and reconnoitring it, a feud begins that is often exceedingly violent and protracted many days.

In seasons favourable to them the Oven-birds build in autumn and winter, and breed only in spring; so that their broods are able to fly by the end of October; when this happens the Swallows that breed in November and December quietly take possession of the forsaken fortress. But accidents will happen even to the wonderful fabric of the Oven-bird. It is sometimes destroyed, and must be rebuilt; its completion has perhaps been retarded for months by drought, or by the poor condition of the birds in severe weather; or the first brood may have perished, destroyed perhaps by a Rat or young Opossum. November, and even December, may thus arrive before some of them have hatched their eggs; and it is these unfortunate late breeders that suffer from the violence of the marauding Swallows. Many of the ovens I open contain the eggs of the Oven-bird, buried under the nest of the Swallows; and I have frequently witnessed the wars of these birds with the profoundest interest. After the Swallows have taken up their station near the oven, they occasionally fly towards and hover about it, returning again to their stand. By-and-by, instead of returning as at first, they take to alighting at the mouth of the coveted

home; this is a sort of declaration of war, and marks the beginning of hostilities. The Oven-birds, full of alarm and anger, rush upon and repel them as often as they approach; they retire, but not discomfited, and only warbling out their gay notes in answer to the outrageous indignant screams of the *Furnarii*. Soon they return, the scene is repeated, and this desultory skirmishing often continued for many days. But at length the lawless invaders grown bolder, and familiar with his strength and resources, will no longer fly from the master of the house: desperate struggles now frequently take place at the entrance, the birds again and again dropping to the ground clutched together, and again hurrying up only to resume the combat. Victory at last declares itself for the aggressors; and they busy themselves carrying in materials for the nest, screaming their jubilant notes all the time, as if in token of triumph. Thus are the brave and industrious Oven-birds often expelled from the house that cost them so much labour to build.

It is pleasant, however, to know that this is not the invariable result of the conflict. To the superior swiftness of the Swallow the Oven-bird opposes greater strength, and, it might be added, a greater degree of zeal and fury than can animate its adversary. The contest is thus scarcely an equal one; and the Oven-bird, particularly when its young are already hatched, is often able to maintain its own. But the Swallows never suffer defeat; for when unable to drive the Oven-birds by force from their citadel, they fall back on their dribbling system of warfare, and keep it up till the young birds leave it, when they take possession before the nest has grown cold.

The nest of this Swallow is composed chiefly of large feathers; the eggs are four, long, pointed and pure white.

You will remark that, in all its habits I have mentioned, this bird differs widely from the *P. chalybea*; there is also great dissimilarity in the manner of flight of the two birds. The *P. chalybea* moves with surprising grace and celerity, the wings extended to their utmost; they also love to sail in circles far up in the air, or about the summits of tall trees, and particularly during a high wind. At such times several individuals are usually seen together, and all seem striving to outvie each other in the beauty of their evolutions.

The *P. tapera* is never seen to soar about in circles; and though when hawking about for flies it sweeps the surface of the grass with amazing swiftness, at other times it has a flight strangely slow, and in a fashion peculiar to itself: the long wings are depressed as much as those of a wild duck when dropping into the water, and constantly agitated with flutterings short and rapid as those of a butterfly.

Neither is the bird gregarious like all its congeners, though sometimes an individual associates for a while with a party of Swallows of another species, but this only when they are resting on fences or trees; for as soon as they take flight he again leaves them. They hold no meetings preparatory to migration, but skim about the fields and open plains in un-swallow-like solitude, and suddenly disappear without having warned us of their intended departure.

2. Descriptions of Ten New Species of Land and Marine Shells. By George French Angas, Corr. Mem. Z.S., F.L.S., F.R.G.S., &c.

[Received March 26, 1872.]

(Plate XLII.)

1. Helix (Xanthomelon) lyndi, n. sp. (Plate XLII. fig. 1.)

Shell imperforate, globosely conical, solid, obliquely plicately striated, the upper whorls minutely granulated, the lower whorls distantly and obscurely concentrically striate, light chestnut-colour above, the last whorl brownish olive, with a faint indication of paler bands below the periphery; spire convexly conical, apex obtuse; suture distinct, crenulated; whorls 5, convex, last whorl descending in front, and contracted behind the aperture; aperture oblique, elongately oval, purplish brown within; peristome with the margins approximating, and united by a thin callus finely and sparingly granulated, the right margin expanded and reflexed, light brown; the columellar margin angulated at the fore part, broadly and flatly expanded, and slightly excavated at the upper part, white tinged with light brown and furnished with a few irregular granules.

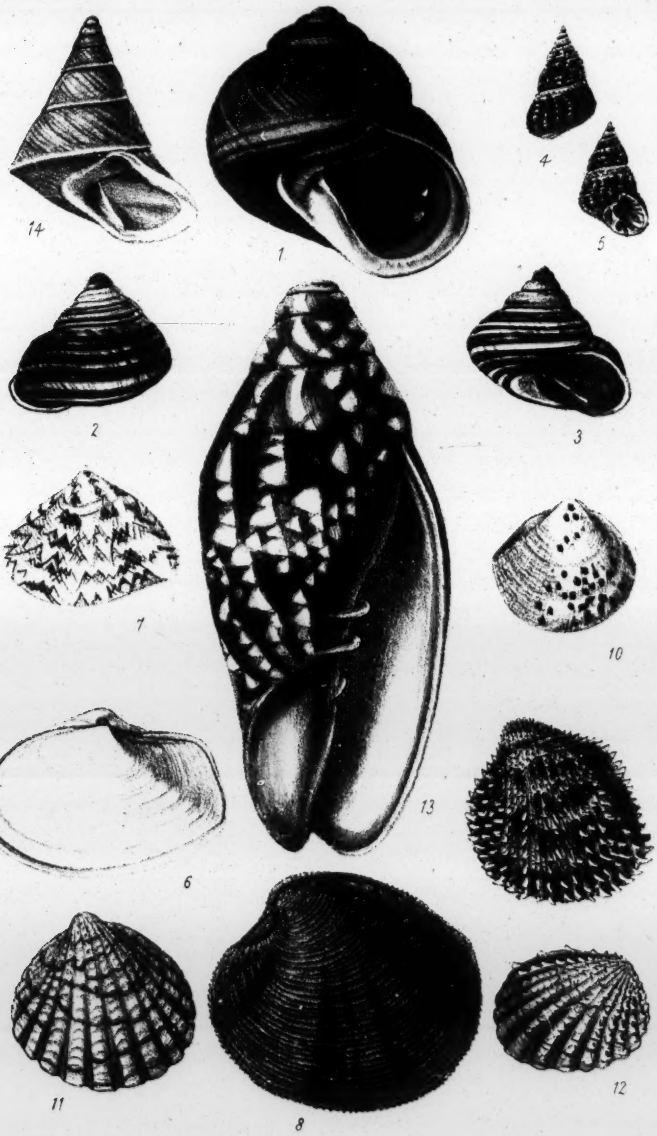
Diam. maj. 20, min. 17, alt. 21 lines.

Hab. Port Essington.

This shell differs from *H. pachystyla* in the spire being more raised, the aperture being more produced anteriorly, with the margins approaching, and the outer lip expanded and reflexed. It also differs in the character of the sculpture, and in being of a darker colour, and having the aperture livid brown instead of white. This species has hitherto been obtained only from Port Essington, whilst *H. pachystyla* is widely distributed throughout Queensland.

2. Helix (Geotrochus) philomela, n. sp. (Plate XLII. figs. 2 & 3.)

Shell imperforate, trochiform, moderately solid, obliquely obscurely striated, whitish, the whorls ornamented in the middle with a broad fascia composed of numerous purplish chocolate bands with a similar fascia below the periphery, and crossed obliquely with close narrow white lines corresponding with the lines of growth; spire conical, apex obtuse, purplish black; whorls 6, moderately convex, sutures impressed, last whorl rather inflated, descending in front, and contracted behind the aperture, base somewhat flattened; aperture subovate, very oblique; peristome thickened, expanded, and slightly reflexed, the right margin a very little sinuated; columellar margin dilated, and furnished within with a prominent callus terminating abruptly within the aperture; the columella and the interior of the aperture dark chocolate-brown, the inner edge of the lip orange, and the reflected portion white, immediately behind which is a pigment-like black deposit on the whorl.



G. Sowerby lith.

M & N Hanhart imp.

NEW AUSTRALIAN AND OTHER SHELLS.

HARVARD
260673
MUSEUM

Diam. maj. 1 inch, min. 10 lines, alt. 10 lines.

Hab. Ysabel Island, Solomon Group.

This species has hitherto been erroneously regarded as the *Helix louisiadensis* of Forbes; but on referring to that author's description and figures in the Appendix to the 'Voyage of the 'Rattlesnake,'' I found it to differ so much as to induce me to examine the typical specimens collected by the late Mr. J. M'Gillivray, and deposited by him in the British Museum; and on comparing the two species I have no hesitation in pronouncing them to be totally distinct, setting apart the wide difference of their localities.

H. philomela may readily be distinguished from *H. louisiadensis* by the absence of the rugose sculpture, by the outer margin of the aperture being scarcely flexuous, by the presence of a conspicuous callus on the columeliar margin, and by the entirely different character of painting, and the coloration of the apex, lip, and aperture. I may observe that a shell from the Louisiade Islands, described and figured by Dr. Cox, of Sydney, in these 'Proceedings' for 1871 (p. 323, pl. 34) under the name of *Helix millicentæ*, appears to be identical with the *H. louisiadensis* of Forbes.

3. THALOTIA WOODSIANA, n. sp. (Plate XLII. figs. 4 & 5.)

Shell convexly conical, solid, spirally ribbed, the ribs on the upper whorls beaded, the beading becoming nearly obsolete on the last whorl, longitudinally obliquely striated, black, with irregular longitudinal white markings; spire convexly conical, apex acute, reddish; whorls $7\frac{1}{2}$, slightly convex, the last whorl a little flattened at the base, where the concentric ribs are stronger and more distant, and decussated by radiating striæ; aperture subovate, somewhat contracted; columella furnished with a few tubercles, and a prominent plait near the base; outer lip simple, thickened within, and furnished with tubercles and several elongate denticles.

Alt. 8, diam. 5 lines.

Hab. Portland Bay, Australia.

4. THRACIA ALCIOPE, n. sp. (Plate XLII. fig. 6.)

Shell oblong-ovate, rather thin, whitish, nearly equilateral, coarsely and irregularly concentrically striated; anterior side ovate; posterior side truncate; dorsal margin posteriorly slightly incurved, anteriorly arcuate; umbones small, subcentral; umbonal ridge raised, obtusely angulate, and slightly curved; ventral margin arcuate; hinge with the cartilage processes small; pallial sinus deep.

Long. $1\frac{1}{2}$ in., alt. 1 in., lat. 6 lines.

Hab. Shark's Bay, Western Australia.

5. CYTHEREA (GOMPHINA) MOERCHI, n. sp. (Plate XLII. fig. 7.)

Shell solid, transverse, triangularly ovate, moderately convex, equilateral, faintly closely concentrically striated, white, with two indistinct radiating bands of a few faint purple effuse blotches, and more or less irregularly ornamented throughout with reddish purple lines,

forming angles of various sizes, the sides having numerous transverse broader markings of a deeper colour; posterior side acuminate; anterior side rounded; basal margin posteriorly flexuous; lunule rather large, elongated, and circumscribed by a slight raised line; umbones central, rather prominent and approximating; interior yellowish white; pallial sinus shallow and rounded.

Long. 1 inch, alt. 8 lines, lat. 6 lines.

Hab. Unknown.

6. VENUS GLADSTONENSIS, n. sp. (Plate XLII. fig. 8.)

Shell rather solid, orbicularly ovate, tumid, inequilateral, the surface decussated with very close, concentric, elevated laminæ, and radiating, very fine, raised ribs, pale ashy-brown; the sides rounded, the posterior one forming an angle with the dorsal margin, which is convex; basal margin arcuate; umbones anterior, situated at about one-third the length of the shell, tumid; the lunule small, deeply impressed.

Length 1 inch 8 lines, alt. 1 inch 3 lines, lat. 1 inch 1 line.

Hab. Port Curtis, Queensland.

This species is sculptured much in the same way as *Venus laqueata*, Sow.; but the concentric laminæ are very much more numerous, and the radiating ribs more distant and less prominent. In size it is smaller, and in form it is less oblique, and the umbones are not placed so far anteriorly. The specimen described is the only one that has come under my notice, and has been placed by me in the British Museum, together with the other species described in this paper.

7. CARDIUM (CTENOCARDIA) VICTOR, n. sp. (Plate XLII. fig. 9.)

Shell quadrangularly cordate, ventricose, equilateral, anterior side rounded, posterior side compressed, slightly concave and angulate, whitish, painted with distant irregular zones and blotches of rosy orange; radiately ribbed, the ribs about 30 in number, narrow and compressed, somewhat broader at the sides, and furnished with erect, compressed, recurved, scale-like spines, the interstices, which are elevated on the anterior side and excavated on the posterior side, are transversely finely imbricate; umbones prominent, close together, and incurved; lunule excavated, not very conspicuous, orange-red; the umbonal ridge strongly marked; interior white under the beak, golden-yellow towards the ventral margin.

Long. 12, alt. 15, lat. 12 lines.

Hab. Mauritius.

The specimen figured is from the collection of Sir David Barclay. It was taken out of the stomach of a fish called in Mauritius "Capitaine," hooked at a depth of 60 fathoms off that island.

8. AXINÆA FRINGILLA, n. sp. (Plate XLII. fig. 10.)

Shell solid, triangularly ovate, moderately convex, slightly compressed, and somewhat angulated anteriorly; umbones rather swollen; cardinal area short and narrow, very finely and closely radiately

grooved and concentrically ridged, whitish, painted with close-set, thin, wavy, concentric, orange-brown lines, and on the posterior half of the shell with numerous, irregular, small, blood-red spots; epidermis thin, consisting of short recurved brown hairs.

Long. 10, alt. 10, lat. 6 lines.

Hab. Port Curtis, Queensland, Australia.

9. PECTUNCULUS MONTROUZIERI, n. sp. (Plate XLII. fig. 11.)

Shell solid, obliquely suborbicular, anteriorly subangulate, moderately convex; umbones prominent; radiately ribbed, ribs about 19 in number, a little flattened and somewhat rugose, the interstices finely concentrically laminate; white, sparingly painted with brown lines crossing the ribs, and sometimes flowing into the interstices, especially towards the ventral margin.

Long. 1 in. 2 lines, alt. 13, lat. 1 line.

Hab. New Caledonia.

10. CARDITA RAOULI, n. sp. (Plate XLII. fig. 12.)

Shell truncately ovate, solid, rather compressed, very inequilateral, strongly radiately ribbed, the ribs about 13 in number, ornamented with elevated spines, which are scaly posteriorly, and more numerous, nodulous, and obtuse anteriorly; white, the posterior ribs tinged with rose-colour, and covered throughout with a thin yellowish brown epidermis; umbones not prominent, compressed, terminal; lunule small and deeply excavated; posterior side rounded; anterior side somewhat truncate; dorsal margin convex; basal margin arcuate.

Long. 11, alt. 9, lat. 5 lines.

Hab. South Tasmania; dredged off Cape Raoul by Admiral Loring.

3. Description of a New Species of *Voluta*. By GEORGE FRENCH ANGAS, Corr. Mem. Z.S., F.L.S., F.R.G.S., &c.

(Plate XLII.)

VOLUTA (AULICA) HARGREAVESI, n. sp. (Plate XLII. fig. 13.)

Shell ovately fusiform, reddish brown, with an indication of two darker bands, ornamented with numerous, scattered, longitudinal, and somewhat angular blotches of white; spire rather elevated, apex very obtuse; whorls 5, convex, the last whorl more than two thirds the length of the shell; aperture narrow, pale yellowish, flesh-colour within; columella almost straight, covered with a thin callus, and furnished with four plaits, the upper two large and transverse, the lower two much smaller and more oblique; outer lip simple.

Length 3 in. 10 lines, diam. 1½ inch.

Hab. Locality unknown.

This fine shell, which, as far as I am aware, is unique, has been placed in my hands for description by Mr. Charles Thatcher, at

whose request I have named it after Mr. Hargreaves, a zealous Australian collector of shells.

4. Description of a New Species of *Geotrochus* from the Island of New Britain. By Henry Adams, F.L.S.

[Received April 10, 1872.]

(Plate XLII.)

Upon examining a small collection of shells made by Capt. Ferguson in New Britain and the Solomon Islands, and forwarded to the Society by Dr. Bennett, of Sydney, I found that the marine shells were all well known, being species which are widely distributed in the Western Pacific; but among the land-shells there was one from the Island of New Britain, which Dr. Bennett had correctly indicated as new, and which is stated to have formed part of a necklace worn by a native of that island for ornament. I therefore subjoin a description of it, and have named it, at Dr. Bennett's request, *G. fergusoni*, after Capt. Ferguson, by whom it was obtained.

Geotrochus fergusoni, sp. nov. (Plate XLII. fig. 14.)

G. *testa imperforata, tenuiuscula, conica, oblique flexuose plicato-striata, (sub lente) spiraliter crebre striolata, pallide fulva; spira elevato-conica, apice acutiusculo, sutura filo-marginata; anfr. 7, subplanatis, ultimo non descendente, ad peripheriam acute carinato, basi subplanato; apertura diagonali, triangulari-ovata; perist. late expanso, vix reflexo, albo, marginibus callo tenui junctis, dextro flexuoso, columellari declivo, substricto, triangulatim dilatato, cum basali angulum formante.*

Diam. maj. 18, min. 13, alt. 32 mill.

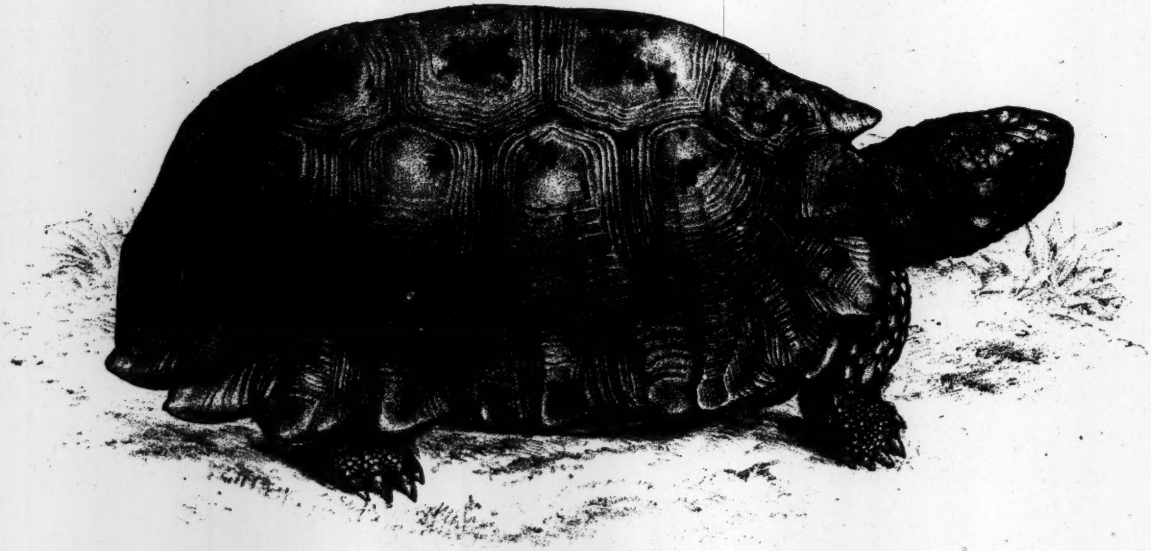
Hab. The Island of New Britain. (Brit. Mus.)

This species is nearly allied to *G. turris*, H. Ad., from the island of Waigiou, in the Malay archipelago, but differs from it in being smaller and thinner, in the basal whorl being acutely keeled instead of being simply angled, and in the absence of umbilicus or perforation.

DESCRIPTION OF PLATE XLII.

Fig. 1. *Helix lyndi*, p. 610.
2 & 3. —— *philomela*, p. 610.
4 & 5. *Thalotia woodsiana*, p. 611.
6. *Thracia alciope*, p. 611.
7. *Cytherea moerchi*, p. 611.
8. *Venus gladstonensis*, p. 612.
9. *Cardium victor*, p. 612.
10. *Axinæa fringilla*, p. 612.
11. *Pectunculus montrouzieri*, p. 613.
12. *Cardita raouli*, p. 613.
13. *Voluta hargreavesi*, p. 613.
14. *Geotrochus fergusoni*, p. 614.

BRITISH
2800c73
MUSEUM



C. Berjeau del. et lith.

Mintern Bros. imp.

PELTASTES FORSTENI

5. On *Peltastes forstenii*, a Species of Land-Tortoise from Celebes. By Dr. J. E. Gray, F.R.S. &c.

[Received April 1, 1872.]

(Plate XLIII.)

We have received, together with other Reptiles from Celebes, collected by Dr. A. B. Meyer, a Tortoise in spirits which is very like *Testudo elongata* in general appearance, but different from it in many essential particulars, as, for example, the shields on the head, the depressed form of the body, and the total absence of any nuchal plate, showing that it is a most distinct species.

I have no doubt that this Tortoise is a specimen of the *Testudo forstenii* of Schlegel and Müller, mentioned in a note to the 'Verhandelingen over de Natuurl. Geschied. Nederland. Overzee. Bezitt.' Reptilia, p. 30, which, as they state, they intended to describe and figure more in detail; but as I am not aware that the description or figure has ever been published, I think it well to send the Society a note and figure of the species.

Dr. Günther has kindly translated for me the following extract of all the particulars which the authors give of this species:—"Shield oblong and very convex; no sternal shield; hindmost sternal scutes small; tail unusually short, obtusely conical; soles with tubercular scales. Scales along the outer margin of the fore feet large, unguiculate. Snout above with a pair of large scutes; then follows a crown-shield, with a moderate shield on each side; the other shields on the head irregular. Light brown above, with irregular larger and smaller black spots; sternum with a large black spot on each side.—Gilolo."

TESTUDO FORSTENII. (Plate XLIII.)

Shell pale yellowish brown, with few black stains, those on the costal and submarginal shields the smallest; oblong, rather broader behind than in front, rather depressed, with a flattened centre to the back. The vertebral plates broader than long, the first shortest, pentangular, produced into an angle in front, the second, third, and fourth rather oblong four-sided, with the middle of the sides rather produced; the last largest, as long as broad. Nuchal plate none. Marginal plates high, the first, second, and third strongly produced, angular; the eighth to eleventh rather produced at the edge and slightly recurved; caudal plate very broad, more than twice as broad as high, rather produced on the hinder edge. The sternum flat, notched in front, and a very large deep notch behind; three front pairs of plates narrow; abdominal plate very large; anal plates small, triangular. Beak strong; upper jaw with three indistinct teeth on the front edge, very obscurely prominent in the middle, between the nostrils; crown covered with symmetrical small shields, the supernasal shields being much the largest; the chin and the throat covered with very minute scales; the fore legs

covered with large prominent scales above and below, which are largest, conical, and most prominent on the outer edge. The hind legs and hinder part of the body covered with unequal shields; tail short, conical.

Testudo forstenii, Schlegel, Verhandl. p. 30, note; Gray, Cat. Shield Rep. Suppl. p. 6.

The examination of the species of *Peltastes* makes me think that the divisions which I proposed in the 'Supplement to the Catalogue' are very natural and useful to be adopted.

They may be divided thus:—

PELTASTES. *Upper beak with three teeth on the front margin.* (Asia.)

* *Beak sharply keeled in front.* P. elongatus (*with a distinct nuchal shield*). P. platynotus *and* P. stellatus (*with no nuchal shield*).

** *Upper jaw bluntly keeled, nuchal shield none.* P. forstenii.

CHERSINELLA. *Beak toothless, rounded in front.* (Africa.) C. geometricus, tentorius, verrouxii, semisulcatus, marginatus, leithii, *and* græcus (*with a nuchal shield*), C. sulcatus (*without a nuchal shield*).

Dr. Meyer has sent home a very young specimen of *Cuora amboynensis* which has three very distinct keels on the back of the shield; our series of this species in the British Museum show that the young is always three-keeled and that the lateral shields gradually disappear as the animal reaches the adult age.

3. Descriptions of three new Species of Marine Shells from Australia. By J. BRAZIER, C.M.Z.S., M.R.S.N.S.W.

[Received March 18, 1872.]

(Plate XLIV.)

1. CASSIS NIVEA. (Plate XLIV. fig. 1.)

Shell thin, inflated, obliquely striated, chalky white; spire rather elevated, apex acute, suture impressed; whorls 6, moderately convex, spirally ridged next the suture, the last whorl angled above and furnished with a row of 13 pointed nodules or tubercles, then excavated, and immediately below the excavation ornamented with eleven rather elongated rib-like nodules; columella straight, arched and expanded over the perforation; lip thin, not toothed, reflexed, the outer edge as well as the columella tinged with orange; aperture ovately lunate, chalky white within.

Length 1 inch 9 lines, breadth 1 inch 5 lines, height 1 inch 2 lines; length of aperture 1 inch 6 lines, breadth 8½ lines.

Hab. Macquarie Harbour, west coast of Tasmania (*coll. Brazier*).

This species was collected by my friend Mr. W. F. Petterd, jun., of Hobart Town, who obtained it some few years ago at the above



G.Sowerby lith.

M.& N.Hanhart imp.

NEW SPECIES OF CASSIS & CYPRÆA.

BRITISH MUSEUM
280673

locality; and, so far as I am aware, no other specimens have yet been found. It differs from any of the *Cassididæ* that I have met with in its thin texture and its pure white colour; the deep rounded furrow or excavation at the angle makes it at once a most conspicuous species.

2. Cassis sophia. (Plate XLIV. fig. 2.)

Shell globosely inflated, rather solid; spire moderately raised, apex rather obtuse; whorls $5\frac{1}{2}$, tabulated above, spirally grooved next the suture, the last whorl obliquely striated and transversely distantly finely ridged, more than four fifths the length of the shell, deeply grooved at the base; columella arched, concave, faintly wrinkled, expanded and covering the perforation; whitish, the last two whorls ornamented with rows of large fulvous-red square blotches; lip reflexed and toothed, the teeth on the basal portion nearly extending across the lip, obsolete at the upper part.

Length 2 inches 9 lines, breadth 2 inches 4 lines, height 2 inches.

Hab. Under Grassy Head, mouth of the Macleay River, north of Port Jackson, New South Wales (*coll. Brazier*).

I obtained this example during a stay of one week at the mouth of the Macleay River. I also obtained broken and beach-worn examples at the mouth of the Nambuccra River, twelve miles further north; but from that to the Clarence River, some hundred and fifty miles, I found no more traces of the species.

3. Cypræa coxi. (Plate XLIV. figs. 3, 3*a*.)

Shell oblong-oval, rather thin, base almost flat; sides rounded, anterior end contracted and moderately prominent, posterior end produced; aperture narrow, nearly straight; teeth thick, obtuse, yellowish white, on the outer edge 13 in number and confined to the margin of the aperture, on the columellar side from 15 to 16, the four lower ones rather prominent, the others almost obsolete; light orange-yellow or cream-colour, smooth and polished, ornamented with two faint yellowish-white bands, with a faint indication of longitudinal hair-like lines; interior cream-colour.

Length 10, breadth $5\frac{1}{2}$, height $5\frac{1}{4}$ lines.

Hab. Dupuch's Island, north-west coast of Australia (*coll. J. C. Cox*).

This species was collected by Mr. Thatcher, about four years ago, at the above locality.

7. Descriptions of six new Species of Land-Shells from Australia and Lord Howe's Island. By J. Brazier, C.M.Z.S., M.R.S.N.S.W.

1. Helix (Microcystis) catletti.

Shell imperforate, depressedly turbinate, rather thin, wrinkled on the upper part, rather shining, horny-green, with a pale yellow

band on the periphery and a dark brown narrow band above and below it; spire depressedly conical; whorls $5\frac{1}{2}$, rather flat, the last rather large and convex, slightly angled in the middle, base moderately convex; covered with a horny-green epidermis; aperture angularly lunar; lip simple, acute, columellar margin shortly reflected.

Diam. maj. 4, min. $3\frac{1}{2}$, alt. $2\frac{1}{4}$ lines.

Hab. Lord Howe's Island, off the coast of New South Wales (*coll. Australian Museum*).

This species I have named after Mr. W. H. Catlett, Secretary of the Royal Society of New South Wales.

2. Helix (Conulus) liardeti.

Shell perforated, depressedly globose, very thin, pellucid, shining, faintly and irregularly, closely, obliquely striated, horny-green; spire obtusely convex, suture moderately impressed; whorls $3\frac{1}{4}$, roundly convex, slowly increasing, the last large, convexly rounded, base convex and striated in the same manner as the upper surface; umbilicus minute; aperture oblique, roundly lunate; peristome simple, margins distant, columellar margin recurved and partly concealing the minute umbilicus.

Diam. maj. $\frac{3}{4}$, min. $\frac{1}{2}$, alt. $\frac{3}{4}$ line.

Hab. Picton, New South Wales; under wood in company with *H. morti*, Cox (*coll. Lieutenant Liardet, R.N.*).

This minute species was collected by my friend Lieutenant Liardet, who only found one example during his stay of a month at the locality given above.

3. Helix (Galaxias) liverpoolensis.

Shell perforate, globularly conical, thin, rather strongly rugosely and plicately striated, (under the lens) finely granulated, covered with a horny-yellow epidermis, with a small narrow chestnut spiral band below the suture; spire conoid, obtuse; whorls $4\frac{1}{2}$, convex, the last large and inflated, descending in front, base convex, smoother than the upper surface; perforation small, more than half covered, encircled with a faint broad chestnut band; aperture oblique, roundly lunate; peristome moderately straight, thin on the upper part, thickened and reflected at the columellar margin, which is white.

Diam. maj. 8, min. $6\frac{3}{4}$, alt. $6\frac{1}{2}$ lines.

Hab. Liverpool range, interior of New South Wales (*coll. Australian Museum*).

This shell was obtained by Mr. George Masters during his visit to the above locality. It approaches nearly to *Helix leptogramma*, Pfr., but differs in having a narrow chestnut band just under the suture, with a faint one of the same colour round the perforation.

4. Helix (Zonites) gawleri.

Shell umbilicated, convexly depressed, thin, very closely rugosely wrinkled with oblique striæ to the periphery, interstices smooth; shining, horny-brown, with dark reddish oblique streaks here and there; spire small, suture impressed; whorls $4\frac{1}{2}$, moderately convex,

the last large, inflated in front, depressed above, base convex, yellowish, glossy, sculptured with striæ giving it a wrinkled appearance; umbilicus large and deep, rounded at the edge, with the striæ more distinct and running into the interior; aperture oblique, ovately lunate, interior pinkish; peristome simple, thin, margins nearly approximating, the outer arched, columellar thin and reflexed.

Diam. maj. 8, min. 6, alt. 4 lines.

Hab. Mount-Lofty ranges, near Adelaide, South Australia (*coll. Brazier*).

This species appears to be quite common in a subfossil state in and around Adelaide.

5. TORNATELLINA INCONSPICUA.

Shell somewhat perforate, rather turreted, very thin, transparent, shining, moderately smooth, with very faint oblique striæ (as seen under the lens), bright yellowish horn-colour; spire very little elongated, obtuse at the apex; whorls 5, convex, impressed at the suture, the last equalling about half of the length; aperture ovate, with a thin central vertical tooth; columella twisted and entering spirally; peristome simple, acute.

Length 1 line, diam. $\frac{1}{2}$; length of aperture $\frac{1}{2}$ line.

Hab. Lord Howe's Island (*coll. Australian Museum*).

6. ? SIMPULOPSIS MASTERSI.

Shell somewhat globose, thin, very faintly and irregularly transversely striated, marked with irregular reddish- and yellowish-brown flames running rather obliquely; spire very small, conical; suture impressed; whorls $3\frac{1}{2}$, convex, the last very largely and openly dilated; aperture rather large, wide, ovately lunate; columella arched, and not thickened; peristome simple, acute.

Length $3\frac{1}{4}$, breadth $2\frac{1}{4}$; length of aperture $2\frac{1}{4}$ lines, breadth $1\frac{3}{4}$ line.

Hab. Lord Howe's Island (*coll. Australian Museum*).

Only one example of this species was found, in company with *Tornatellina inconspicua*, by Mr. Masters when collecting at the above island.

8. Additional Notes on the Raptorial Birds of North-western India. By A. ANDERSON, F.Z.S.

[Received April 9, 1872.]

Since forwarding my last paper on the Raptorial Birds of North-western India (see P. Z. S. 1872, p. 68), I have gathered together a considerable amount of valuable information relative to some of the species therein touched upon, which I hasten to lay before the Society.

Following the same order as before, I shall commence with the Imperial Eagle of Jerdon, and proceed to show that under this name

we have two *distinct* birds, viz. *Aquila crassipes* (of Hodgson's unpublished MS. and drawings) and *Aquila bifasciata*.

I should, however, premise by stating that *Aquila imperialis* (*vera*), Cuv., would appear to be quite distinct, as already pointed out by Mr. Howard Saunders*, and that it is questionable whether this species has as yet occurred in India.

My endeavours towards procuring specimens of these two Eagles in *transitional* stages have been crowned with success, and I am now in a position to prove *beyond doubt* that two species have hitherto been confounded in the fourfold stage described by Hume† (as surmised in my former communication), each of them having what appear to me three well-marked stages.

I shall characterize them separately, as briefly as possible.

1. AQUILA CRASSIPES (Hodg. unpublished MS.). The *Indian*‡ Imperial Eagle.

Under this time-honoured name§, which I propose being retained for this species, now separated for the first time, Hodgson has figured two lineated birds corresponding with Hume's *first* stage of Jerdon's Imperial Eagle. The figures have been most artistically executed, and agree in every detail with the lineated birds which visit the plains of India in such numbers during the cold season.

During the months of December and January last I was fortunate enough to shoot a pair of Eagles, male and female, passing *direct from the lineated to the black-brown stage, which eventually obtains white scapulars*; or, in other words, Hume's first and *fourth* stages are referable to this species—his second and third to the sister Eagle, which is the true *Aquila bifasciata*.

My friend Mr. Brooks has favoured me with the following detailed description of these two birds:—

"No. 1. *A. crassipes* clearly shows that the lineated bird passes *direct into the black-brown one, which eventually gets white scapulars*. The upper part of the back and lower neck *above* still retain the light-centred feathers so characteristic of the lineated stage. The tail retains some of the plain brown feathers almost without markings of any kind, which tail-feathers are characteristic also of the *lineated* stage. Many of the secondaries and tertials are those of the *young* bird. Below the plumage is a mixture of black-brown and brownish white or fulvous. Many of the feathers about the breast are light-centred ones, as also the neck-hackles; other feathers have the central and apical portions dark brown. I am not quite sure but that the change to black-brown occurs, *not by a mouit, but by a gradual change of colour in the feather, commencing with the tips*; sometimes working with regularity up the centre of the feather, at others affecting one side more than the other. The tibial plumes of this bird are fulvous white, mottled with dark brown;

* P. Z. S. 1871, p. 38.
† Rough Notes, Part I. pp. 147–151.
‡ I add the word *Indian* in contradistinction to the *true imperialis*.
§ Hodgson's MS. and drawing is dated 1838.

the general appearance of the abdomen is fulvous white, patched with black-brown.

"No. 2. *A. crassipes* is a much further advanced bird (leading up to *my* second stage), and only a few light-centred feathers can be found. Some of the secondaries, however, and the tertials are those of the *young* bird. Numbers of the neck-hackles are *still unchanged*; *and these are peculiarly those of the lineated stage.* The tail of this example is entirely changed, and is that of the *adult crassipes*, with a broad terminal black band. Below the bird is a mixture of black-brown and fulvous, the former largely predominating; there are a few light-centred feathers still left. The tibial plumes are black-brown. This bird, to me, also appears to show that the *feathers change colour without a moult.* My remark applies to the body-feathers, and not those of the wings and tail."

Having above referred to *three well-defined* stages as appertaining to this Eagle (the first, of course, is lineated throughout), it now remains for me to add that the second phase of plumage is black-brown, with fulvous-coloured head and neck, but *without any white on the scapulary region* (the two birds above described will eventually belong to this stage), and the third the fully adult, viz. black *having white scapulars*, in addition to the fulvous-coloured head and neck—Hume's *fourth* stage, under which description this Eagle has hitherto been considered the true *Aquila imperialis*.

I have added very considerably to my already good series of *Aquila crassipes* in the two last-mentioned stages; and it is interesting to notice the appearance of these white feathers on the scapulars. One youngish example has these feathers, which do not appear with any degree of regularity, particoloured, one side of the shaft being white, the other buff. This, therefore, favours the theory that the feathers in this Eagle change colour without a moult.

The "Striated" Eagle referred to by the Secretary in his recent report on the additions to the Menagerie* is, I am pretty confident, referable to my first stage of *A. crassipes*; and it will be interesting to watch its gradual change to maturity.

2. AQUILA BIFASCIATA, Gray. The Double-banded Eagle.

The double-banded bird, which is equally common with the young of *A. crassipes*, has also been figured by Hodgson, under the name of *bifasciata*.

The whole chain of evidence with regard to the several stages of this Eagle is also beyond dispute. First we have the typical *light-brown* birds with double bars, sometimes white and at others fulvous; second, the uniform brown birds, a shade darker, but *without* bars; and third, the uniform brown birds, with the addition of a fulvous-coloured nuchal patch the size of a crownpiece. Hodgson has also figured a bird corresponding with this latter in every detail; but the plate does not bear any name.

In case it may be necessary to point out the *intermediate* phases of plumage *between* the above *distinct* stages, I need only state that

* P. Z. S. 1871, p. 545.

my collection contains light-coloured examples (referable to the first stage) with the typical double bands, with *one* band, and with *no* band at all, and, lastly, that some of these very birds, while yet in the first stage, have a profusion of *darkish*-brown feathers, so characteristic of the second stage.

Since the separation of these two Eagles according to their plumage, I have noticed that there *is* an appreciable difference, very slight it is true, between the nostrils of the two species, and that the osteological characters too, as far as I have yet gone into the matter, tend to separate them. In the sternum of *A. bifasciata* will be found apertures about the size of a twopennypiece, while in *A. crassipes* these are altogether wanting.

AQUILA HASTATA, Less. (juv.).

In my former notes I alluded to only two distinct stages in the plumage of this Eagle, viz. the "spotted" and "uniform plain brown." I have now to add a description of the *first* or "streaked" stage of the juvenile bird, in which dress both Mr. Brooks and I have obtained some six examples.

Nothing can exceed the remarkable contrast between young *A. nævia*, with its purple-black mantle covered *all over*, more or less, with spots or blotches, and the delicate yellow-brown of *A. hastata*, streaked longitudinally on the under plumage, and having minute specks which are confined entirely to the ridges and bend of the wings.

I have now been able to add this bird to the avifauna of the districts of Cawnpore, Etawah, and Mainpuri; so that it is by no means the rarity now that it was considered only a short time ago.

Description of a typical juvenile bird.—The young bird is generally of a pale yellow-brown, and the lower surface from breast downwards is extensively streaked with fulvous white. The secondaries and tertials are *profusely barred*, as also the tail to the very tip, which is pale or whitish. The carpus and ridges of the wing are profusely blotched with fulvous white. In some specimens of the juvenile bird these spots are either very minute or entirely absent; the amount of spotting, therefore, cannot be a true index of age. Again, in some examples there are neither spots on the wings nor any striation on the lower plumage; but these may be passing into what I have described as the *second* or "spotted stage," when the bird will assume a darker brown colour, and the spots on the wings will then appear with a more decided character.

The head of the young bird is of a uniform pale brown, without any light tips to the feathers, which older birds frequently have. The terminal upper tail-coverts are brownish white, the ends being almost quite white; these are barred on the outer webs with pure white.

The lining of the wing is generally fulvous white, mottled with brown. The tarsus is dull brownish white, slightly freckled with pale brown; the tibial plumes are brown, a good deal mottled with brownish white.

The perfectly *adult* bird (my third stage) is of a uniform dark

hair-brown and *entirely spotless*; the wings and tail also are free from bars, which are so characteristic of the younger stage. In this stage it strongly resembles pale specimens of *A. nævia*; and any one not acquainted with the very different structure of the two birds might mistake it for a small adult of that species.

EUTOLMAËTUS BONELLII, Temm.

In reference to the tree-nesting propensity of this species, previously alluded to (p. 76), I have only to add that I found two nests this season, both of them built on lofty peepul trees. They each contained a pair of eggs, remarkable for being well stained with decayed vegetable matter, notwithstanding they were quite fresh, and for the absence of all colouring matter.

The nests measured respectively $3\frac{1}{2}$ feet × 2, and $4\frac{1}{2}$ feet × $1\frac{1}{2}$. Both of them were perfect plane surfaces, with no perceptible depression in the centre; and in both cases fresh green twigs were used as a nest-lining. The first nest contained two mango twigs, measuring respectively $11\frac{1}{2}$ and 8 inches long, with thirteen and ten green leaves adhering to them. These were *nibbled* all over by the birds while performing the task of incubation; but with what object, it is impossible to conjecture.

The season of incubation is confined to the coldest time of the year, viz. from about the 25th of December to the end of January.

The first nest above alluded to was watched by me while in the course of construction; and I noticed one morning that the female bird was still in the immature garb. I was fortunate enough to shoot her off the nest; and her general plumage below is what I take to be about three years old: the breast has become white, but the lower belly and thighs are still of a buffy fawn-colour.

MILVUS ——?

The small Marsh-Kite I have before referred to (p. 79) first made their appearance in ones and twos before the end of September; and they were then terribly wild, just as much so as *Milvus major*. Later in the season (December and January) they became gregarious, and confined themselves to marshes and grassy swamps. As the season advanced, so their wariness seemed to wear off; and as the country dried up they began associating with the village Kites, till they became just as audacious as their allies *M. govinda*.

I have seen as many as fifty of the small Marsh-Kite on the wing at a time; and the conspicuous white or pale-buff patches under the wings suffice to distinguish them from the village Kites at a glance.

Early in the season the Marsh-Kites appear to keep to open country, and then do not intermingle with the other species; but I have come across numerous places where villages are situated on the banks of swamps; and then, of course, both kinds are always to be seen together. They have now (14th March) nearly vanished, and by the end of the month I do not think one will be left.

9. Description of a young Tapir from the Peruvian Amazons. By Dr. J. E. Gray, F.R.S. &c.

[Received April 2, 1872.]

(Plate XLV.)

There is a skin of a young specimen of Tapir in the British Museum, brought by Mr. E. Bartlett from the Peruvian Amazons, which is differently coloured from any of the other specimens in the collection, and certainly indicates a peculiar local variety, if not a distinct species. The upper part of the body is dark brown, and white beneath; the back is marked with five or six narrow white stripes, extending from the shoulders to the hinder part of the back, where they unite, forming parts of circles; the three upper ones on each side unite on the hinder part of the back, the third pair being united just above the base of the tail; the upper stripes are generally continued, or only once or twice interrupted in their length; the lower ones are more broken; and the lowest on the sides of the belly are formed of more or less elongate stripes; there is generally between the pale stripes upon the upper part of the body a more or less regular series of small white spots, those between the two upper stripes being on the vertebral line. The upper part of the head pale brown, with some minute white spots on the middle of the face before the eyes; the temples, the cheek under the eye, and the sides of the hinder part of the head with rather larger white spots; these spots become rounder and larger on the sides of the hinder part of the head, and at length form elongated white stripes on the pale brown sides of the throat; the ears have a distinct white edge, and some distinct white spots on their outer side. The legs are marked with white spots to the end of the toes, those on the upper part of the fore legs being large and oblong, and of very different sizes. The middle of throat, belly, and hinder edge of thighs white.

This animal is, in the number of its stripes and its spotted feet, most like the young of *Tapirus terrestris* of the plains of Northern Brazil; but it differs from that in the stripes being much more regularly longitudinal and continuous, and in the top of the head having only a few minute spots before the eyes, the rest being all brown. I should propose to call this *Tapirus* (*terrestris*) *peruvianus*.

It is represented in the accompanying figure (Plate XLV.).

The skull of this specimen was obtained at the same time with the skin, and is in the British Museum. It is in a very young state, showing all the sutures, and with three molars in the upper jaw and two in the lower jaw developed. The crown is gradually rounded from the base of the nasal bone; but unfortunately we have no other skull of the genus in the Museum to compare it with.

Mr. Edward Bartlett has kindly sent to me a skull, now in the British Museum, which he says is that of the mother of the young animal the skin and skull of which are above described. They were

P. Z. S. 1872. Pl. XLV.



C.Berjeau del et lith.

Mintern Bros. imp.

TAPIRUS PERUVIANUS. jr.

BRITISH
MUSEUM
280c73

taken at Santa Cruz, Huallaga River, Eastern Peru, on the 31st of May 1868.

I cannot see any essential difference between the adult skull of the female and other skulls of *Tapirus terrestris* in the British Museum.

The British Museum has also procured from Mr. Bartlett a fully developed skull, but without quite fully developed teeth, of a Tapir from Eastern Peru, which differs only in the nasal bones being rather broader from the skull of the adult female above noted.

There is also a nearly adult skull in the British Museum, obtained by Mr. Edward Bartlett in an Indian house, in 1866, at Chyavitos, on the Peruvian Amazons, which appears to belong to the same species as the two former, but has still shorter and broader nasal bones. All these skulls have the raised arched ridge along the middle of the crown.

The young Tapirs in the British Museum from various localities, as above recorded, may be synoptically divided thus:—

1. *The feet and lower part of the legs brown, with large white spots of unequal size.*

A. The upper part of the head brown, covered with small white spots; body with irregular white stripes, and white lines or spots. *T. terrestris*, p. 492, Plate XXII. fig. 3. (W. Indies?)

B. Top of the head brown, with some small white spots before the eyes; sides with a regular stripe, sometimes broken, and with a series of small white specks between the stripes. *T. peruvianus*, Plate XLV. Peruvian Amazons.

2. *The feet and legs and upper part of the head and nape uniform dark brown, without any pale spots.*

A. Sides of the back with longitudinal stripes and with small unequal spots on the sides; belly dark-coloured. *T. ænigmaticus*, p. 490, Plate XXII. fig. 1. Ecuador.

B. Sides of the body with stripes of unequal length, and a few spots obliquely disposed; neck and belly yellow. *T. ecuadorensis*, p. 492, Plate XXII. fig. 2. Ecuador.

10. On some new or rare Birds' Eggs.

By Henry Buckley, F.Z.S.

[Received May 7, 1872.]

I have pleasure in bringing before the Meeting the eggs of three species of North-American birds, which I believe have never previously been exhibited, although Professor Newton, on one or two former occasions, has given some notes on one of them (the Swallow-tailed Kite); but I still trust that my brief remarks even on that species will not be without interest.

FALCO POLYAGRUS (Cassin). (Prairie Falcon.)

This egg, as might be expected, closely resembles that of *Falco jugger*, and was found by my correspondent Mr. L. E. Ricksecker at the head of Echo Cañon, in Watsatch Mountains, Utah, U. S., May 23, 1868. He writes me:—

"The nest was placed in a niche at the top of an isolated rock about 20 feet high, and had evidently been used by the same or by some other pair of birds for a number of years, as it had the usual appearance of old Crows' and Hawks' nests. It was much flattened, and the materials were earth and sticks. It contained four eggs, which were nearly fresh, incubation having barely commenced. The altitude of the Cañon at the place where the nest was located is over 6500 feet above the level of the sea; and the weather even at that late date had not become settled, snow-squalls being of frequent occurrence for more than another week.

"I spent the whole summer of 1871 near this place, and I believe we had some frost during every month. I saw both the parent birds, and secured the male, which I forwarded to the Smithsonian Institution; and Professor Baird told me it was the first adult male skin he had received."

ELANOÏDES FURCATUS (Linn.). (Swallow-tail Kite.)

Of this species I have the pleasure of exhibiting seven eggs taken from four different nests. They were collected in Black-Hawk County, in the State of Iowa, U. S. A.; and my correspondent informs me that in that locality the eggs are found from May 22nd to June 8th; and, so far as his experience tells him, the complement of eggs is always two.

The nests are built of sticks and moss, and are generally placed in high trees.

ICTINIA MISSISSIPPIENSIS (Wilson). (Mississippi Kite.)

This rare egg was collected by one of the correspondents of the Smithsonian Institution, Washington, U. S. A. The nest, composed of only a few sticks, contained two eggs, and was found on the 12th of June in a tree about 15 feet high; and one of the parents was secured.

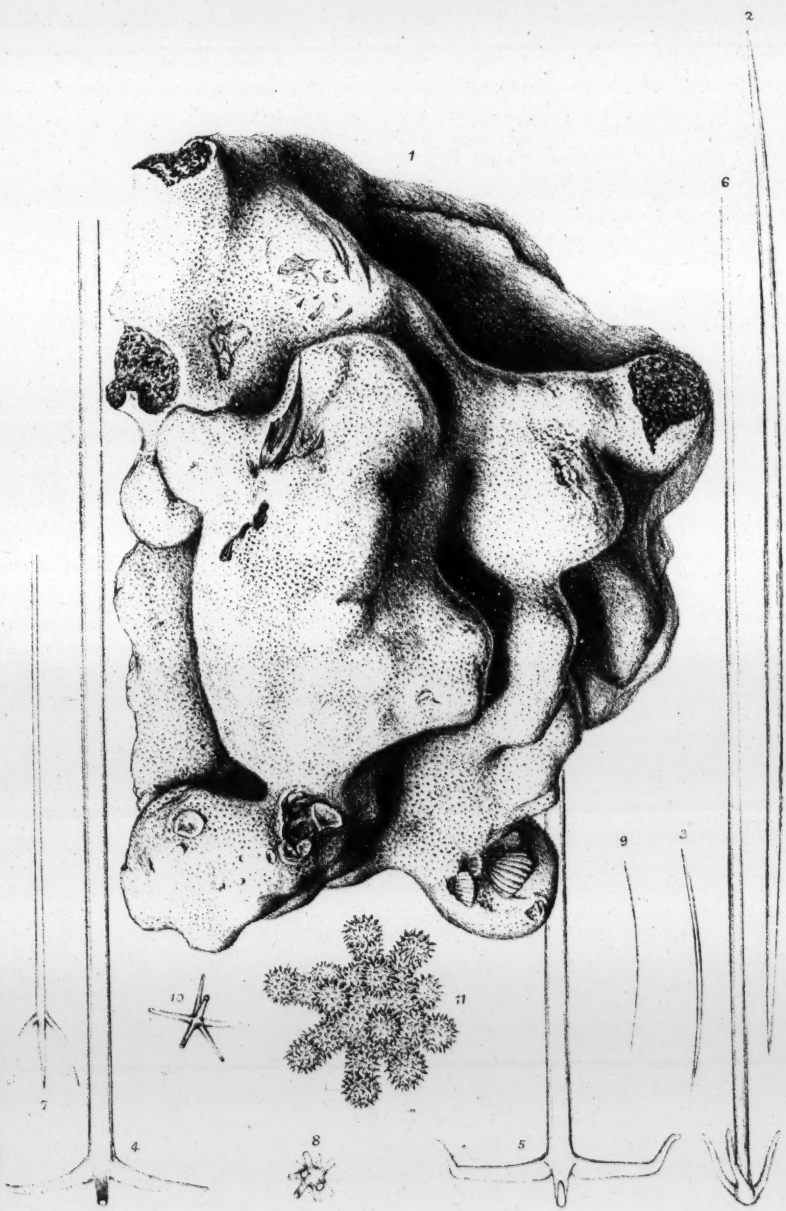
11. Contributions to a General History of the *Spongiadæ*. By J. S. BOWERBANK, LL.D., F.R.S., &c.—Part III.

[Received April 11, 1872.]

(Plates XLVI.–XLIX.)

GEODIA TUBERCULOSA, Bowerbank. (Plate XLVI.)

Sponge massive, sessile, somewhat cup-shaped. Surface abounding in large tubercular prominences; furnished abundantly with ex-

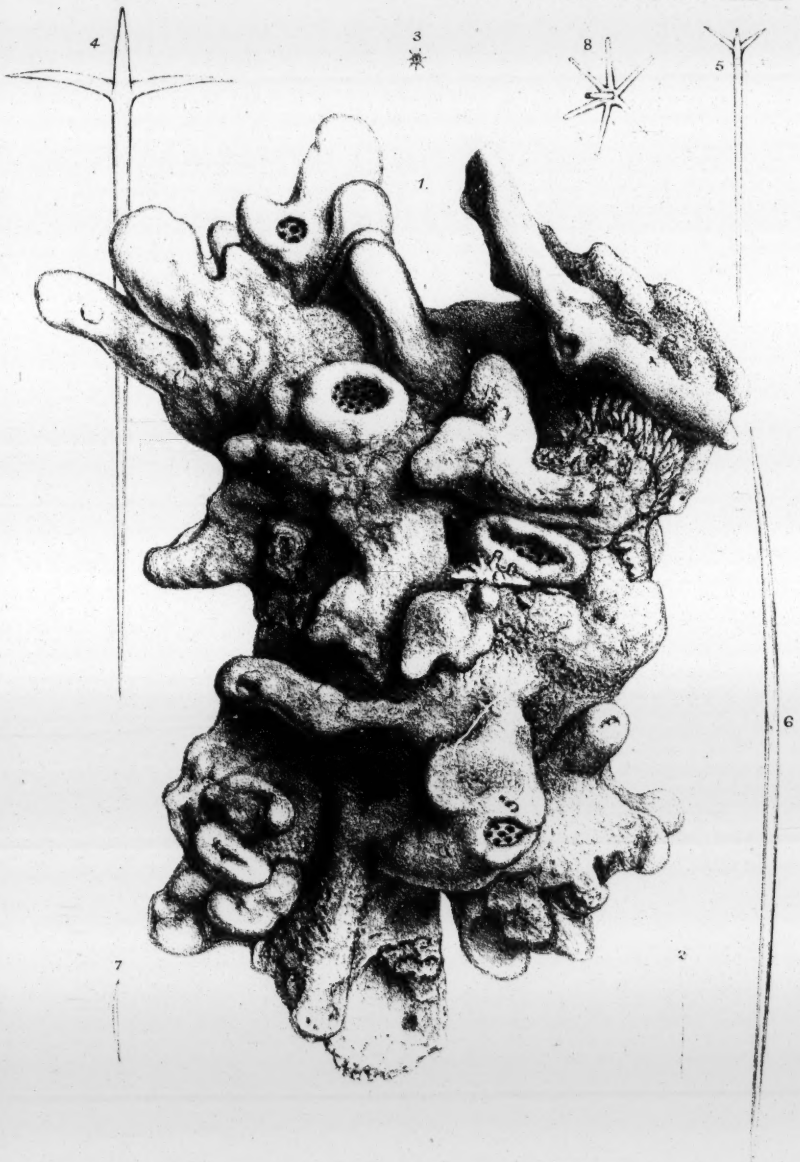


Geodia tuberculosa.

W. Lons Aldous del. et lith.

W. West & Co. imp

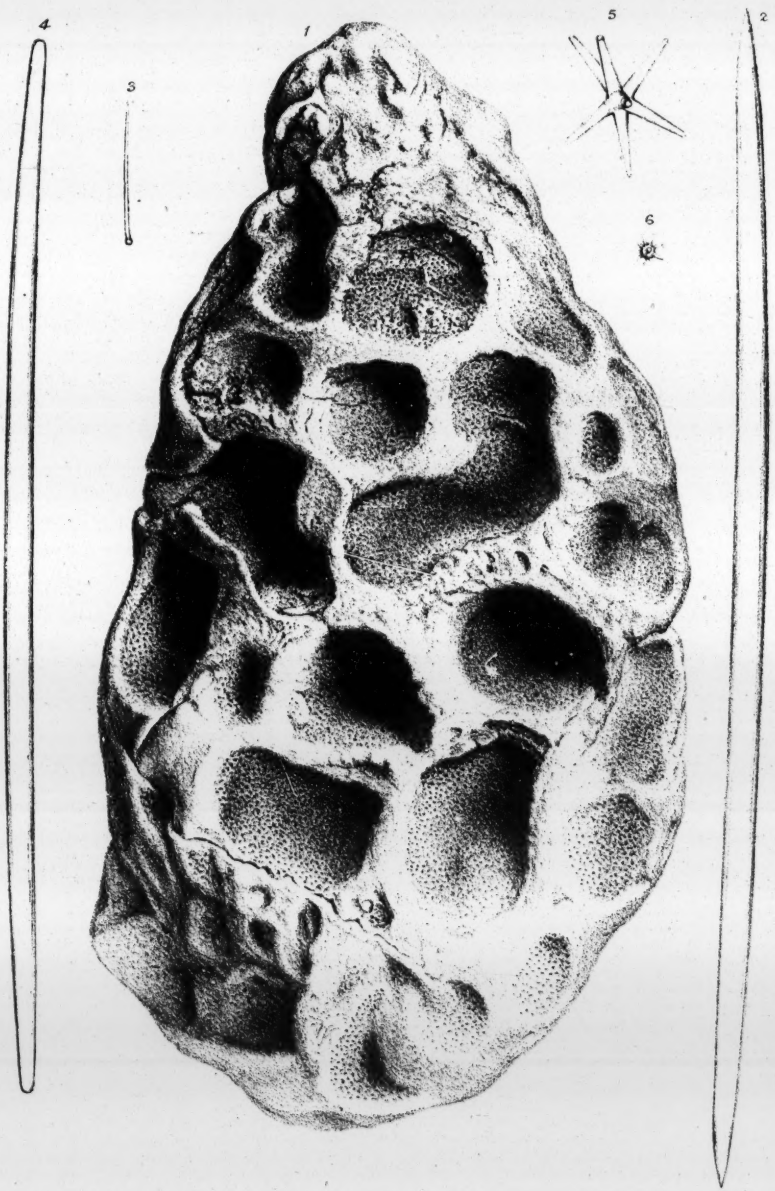
BRITISH
28 OCT 73
MUSEUM



Geodia tumulosa.

W. Lone Aldous del. et lith. W. West & Co. imp.

BRITISH
2806.73
MUSEUM



Pachymatisma areolata.

W. Isens Aldous del. et lith.

W. West & Co. imp.

BRITISH
28OC73
MUSEUM



Hymeniacidon angulata.

W. Lens Aldous del. et lith.

W. West & Co. imp.

BRITISH
2800673
MUSEUM

ternal defensive spicula: primary series large and long acerate spicula, usually obsolete; secondary series acerate, minute. Oscula simple, small, and numerous, usually congregated in deep cavities. Pores congregated in minute areas; porous areas conspicuous, very numerous. Dermal crust rather thin, composed of small globose ovaria. Dermal membrane thin and pellucid, abounding with minute cylindro-stellate spicula, rarely subsphero-stellate; radii numerous. Skeleton—spicula fusiformi-acerate, rarely acuate, large and long; connecting spicula patento-ternate, stout, terminations of the radii occasionally recurved; and also with numerous slender recurvo-ternate, and rarely with porrecto-ternate, or spiculated porrecto-ternate spicula. Interstitial membranes—tension-spicula acerate, slender, few in number. Retentive spicula attenuato-stellate, comparatively large, and very numerous; radii few in number, and frequently incipiently spinous, and rarely with large cylindro-sphero-stellate spicula with radii apically spinous. Ovaria spherical, rather small and very numerous.

Colour in the dried state cream-white.
Hab. Mexico (*Mr. Thomas Ingall*).
Examined in the dried state.

The exterior form of the specimen is very like that of the large Neptune's-cup sponge with the interior space nearly filled up to the brim. It is $5\frac{1}{4}$ inches in height, and its greatest diameter is about 4 inches. It has no apparent base, but has evidently been supported by several points of attachment to the stems of small fuci or zoophytes, amidst which it has been developed. The external surface is very irregular, being covered with large irregular nodular projections nearly an inch in height, and from half to three fourths of an inch in diameter. There are several deep indentations or pits in its substance; and the terminations of two of these on opposite sides of the sponge have met and formed a passage completely through it. Within these deep indents the oscula appear to be congregated; and there are also a considerable number of them on one side within the terminal cup of the sponge. The greater portion of the surface of the sponge is denuded of the large primary series of defensive spicula; but in one of the deep indentations they remain *in situ*; and on a large portion of the thick rim of the cup they are present, crushed down into a compact layer, intermingled with confervoid vegetation, to which it is most probable we are indebted for their preservation on that portion of the sponge. That the whole of the external surface has been armed with these large spicula is amply proved by their basal portions remaining imbedded in every part of the crustular dermis that has been examined under the microscope. The secondary series of external defensive spicula are imbedded near the outer surface of the dermal crust, their distal points projecting numerously, but to a very short distance, beyond the dermal membrane. The porous areas are abundant on the greater portion of the exterior surface of the sponge; to the unassisted eye they appear like a series of impressions made by the point

of a pin. The dermal crust rarely exceeds about one fourth or one third of a line in thickness. The retentive spicula of the dermal membrane are very minute, and require a microscopical power of about 700 linear to clearly demonstrate their forms. Their greatest diameters from opposite points of their radii is not more than about one sixth or one fifth of that of one of the skeleton-spicula. They are exceedingly numerous, and in many parts of the membrane very closely packed together.

The similar description of spicula on the interstitial membranes are very distinct in size and structure from those of the dermal membrane; their extreme diameters from opposite points of their radii average about two thirds of that of a large skeleton-spiculum; the radii are few in number and gradually attenuate to a sharp point. When examined with a microscopical power of about 700 linear the radii generally exhibit traces of incipient spination. These spicula are very numerous, and some parts of the membrane are crowded with them.

The large cylindro-sphero-stellate spicula are sparingly intermixed with those of the interstitial membranes; they are much longer and stouter in their structure, some of them being nearly as large as an average-sized ovarium. The apices of their radii terminate hemispherically, and they are profusely covered with large conical spines. These spicula are very characteristic of the species. I do not recollect having seen the same form before in any species of *Geodia*.

GEODIA TUMULOSA, Bowerbank. (Plate XLVII.)

Sponge massive, sessile, tumulous. Oscula congregated in shallow depressions on the apices of the tumulous projections, simple, numerous. Pores—congregated porous areas conspicuous, very numerous; pores inconspicuous, few in number in each area. Dermis crustaceous, thick, densely crowded with ovaria; dermal membrane pellucid, thin, crowded with very minute cylindro-subsphero-stellate spicula; tension-spicula acerate, minute, few in number. Connecting spicula attenuato-patento-ternate, large and stout, not very numerous. Skeleton—fasciculi polyspiculous; spicula fusiformi-acerate, large and stout. Interstitial membranes—tension-spicula acerate, small, and few in number; retentive spicula attenuato-stellate, rather large, very numerous and very minute, few in number. Ovaria spherical, slightly depressed, very abundant in the crustaceous dermis, and numerously dispersed on the interstitial membranes.

Colour in the dried state light ochreous yellow.

Hab. Honduras (*Mr. Dyson*); Jamaica (*Mr. Gosse*).

Examined in the dried state.

The figure represents the upper surface of the specimen I obtained from Mr. Dyson, who found it at Honduras. Its greatest thickness is $2\frac{3}{4}$ inches. Portions of its surface are thinly coated by a parasitical halichondroid sponge, and especially the underside of it. It was originally based on the valves of a dead *Pectunculus*, which is still attached to its under surface, in which it is partly

imbedded. The specimen from Jamaica is rather larger than the type one; it is 8½ inches in length by 4½ inches in breadth. The two specimens are very similar in all their external characters; there is only this difference in their condition—that while in the type specimen nearly all the oscula in the sunken areas on the tumuloid bodies are open, in the specimen from Jamaica the greater number of them are closed, and it is only in two or three of the smaller groups that they are open, and exhibit precisely the same characters as those in the Honduras specimen. Both specimens are more or less covered with thin light-brown parasitical Isodictyas, and especially on their under surfaces. There are none of the oscular areas on the underside of either of the two specimens; nor could I detect a single osculum on any other part of the specimens than those within their proper boundaries. The porous areas are visible to the unassisted eye; they are very numerous, and closely adjoining each other. In a thin slice from the dermal surface, mounted in Canada balsam and viewed with a power of 180 linear, they were very distinctly exhibited. Each porous area was furnished with a thin and very pellucid membrane, on which was dispersed an innumerable quantity of exceedingly minute cylindro-subsphero-stellate spicula, and a few very slender acerate tension ones. The pores in the greater number of the areas were closed; in a few they were open, and in these their number did not exceed four or five; when in a closed condition their positions were frequently indicated by minute circular areas destitute of the surrounding minute stellate spicula.

The dermal crust of the sponge is very thick; it is composed of an infinite number of fully developed ovarian bodies closely packed together. The whole of them appeared of uniform density. The external dermal membrane was crowded with closely packed very minute attenuato-stellate spicula, with a few small acerate tension ones.

The ternate apices of the fully developed connecting spicula are cemented firmly to the inner surface of the dermal crust; and their shafts descend amidst the distal ends of the skeleton-fasciculi. The greater number are purely ternate; but occasionally one or more of their radii become furcated. At a short distance beneath the crustaceous dermis, imbedded amidst the skeleton-fasciculi, a few young ternate spicula may frequently be seen in an incomplete state of development, as if in reserve, to be brought forward if necessary for the support of the crustaceous dermis.

The skeleton-fasciculi are rather irregularly disposed, but they always, more or less directly, radiate in lines from the centre of the sponge, or of the projecting parts of it, to the surface. The interstitial membranes are furnished with the same description of small acerate tension-spicula that are found in the dermal membrane, and, as in that organ, they are few in number. The retentive spicual are different from the very minute ones that abound in the dermal membrane. They are the same description of spiculum, but very much larger, and have much fewer radii, and they are very long and acute. The interstitial membranes abound also with ovarian bodies in all

stages of development. In their earliest state they appear as small smooth spheres imbedded in a thick coat of gelatinoid sarcode; and in this condition the ovary measured $\frac{1}{161}$ inch in diameter. In the next stage the diameter is considerably increased, and the infant ovary is furnished with numerous long and acutely pointed spicula; and every gradation of its development may be traced until it attains maturity. As it progresses in development the spicula appear to become shorter and stouter, until in its fully developed and exhausted state their distal ends are all cemented into a continuous smooth mass, every distal termination having a completely truncated appearance, and the whole mass having become as solid as a minute sphere of glass. In this condition an average-sized one measured $\frac{1}{182}$ inch in diameter. The greater portion of these organs in the dermal crust are in the solid and exhausted state; but on the external surface of the dermal crust there were many of them containing spherical masses of ova varying in size from about one fifth to half the diameter of the ovary, and of a jet-black colour, and on some of them I observed small patches of these exceedingly minute ova spread over the surface of the ovaria, as if they had been just ejected from those bodies at the time when the sponge was taken from the sea.

PACHYMATISMA AREOLATA, Bowerbank. (Plate XLVIII.)

Sponge massive, sessile, parasitical(?); surface uneven, full of large deep areas or depressions. Oscula minute, numerous, congregated in the deep areas of the surface. Pores inconspicuous. Dermis crustular, rather thick, filled with ovaria; furnished rather sparingly with large acerate or acuate primary external defensive spicula, and abundantly with small fusiformi-acerate secondary external defensive spicula. Dermal membrane pellucid, furnished sparingly with small fusiformi-acerate tension spicula; and abundantly with very minute and short fusiformi-cylindrical incipiently-spined retentive spicula, and sparingly with large and small attenuato-stellate spicula. Skeleton—rete open and strong, entirely irregular; spicula large, fusiformi-acerate, rarely acuate. Connecting spicula attenuato-patento-ternate, large and strong, few in number. Interstitial membranes —tension-spicula small, fusiformi-acerate, like those of the dermal membrane, few in number. Retentive spicula the same as those of the dermal membrane, very numerous. Ovaria subspherical, slightly depressed; reticulations of surface minute and delicate.

Colour in the dried state cream-white.
Hab. The Red Sea (*Mr. Hugh Cuming*).
Examined in the dried state.

I obtained this sponge from the late Mr. Hugh Cuming, who received it, with other specimens of natural history, from the Red Sea. It is a depressed mass of an irregular elongate-ovate form, 7 inches in length, $3\frac{3}{4}$ inches in width, and $2\frac{3}{4}$ inches at its greatest thickness. There is no basal attachment apparent, and it has every appearance of having been unattached at the bottom of the sea for a consider-

able period. That which has apparently been its upper surface, under these circumstances, is crowded with large irregularly shaped depressed oscular areas, exceeding sixteen in number, and varying in diameter from half an inch to an inch and half, the elevated ridges intervening rarely exceeding a quarter of an inch in thickness, the areas varying from one to six lines in depth. On that which has apparently been the lower side of the sponge there are shallow indications of a few such areas; but the whole of this surface otherwise is smooth and even compared with the upper one. The greater portion of the surface is denuded of its large external defensive spicula; but on the under surface there is a triangular space equal to somewhat more than a superficial square inch on which they are in excellent preservation, intermingled with numerous spicula of the secondary series of defensive spicula, all compressed and matted together on the surface; and in several of the oscular areas on the upper surface the secondary series of external defensive spicula are exceedingly numerous *in situ* and in their natural positions, and are so abundant as to completely obscure those organs, like thick tufts of wetted hairs.

The oscula in each area are very numerous and closely adjoining each other, and, as might therefore be expected, are very minute, and are not visible until denuded of the secondary external defensive spicula.

The pores are dispersed over all parts of the sponge not occupied by the oscular areas; they are very minute, and are scarcely visible with the aid of a lens of an inch focus.

The dermal and interstitial membranes have but few comparatively of the fusiform tension-spicula, which are of the same form and of about the same size as those of the external secondary series of defensive spicula; but both descriptions of membranes abound with the minute short fusiformi-cylindrical incipiently spined retentive spicula. These organs are exceedingly interesting, and very characteristic of the species. They are irregular in their forms and proportions; but when well developed they are about three times the length of their greatest diameter, and their length, as compared with the diameter of a full-sized skeleton-spiculum, is as about one to eight. They are so minute as to require a microscopical power of about 800 linear to define their form and spination distinctly. In some parts of the membranes they are so numerous as to entirely obscure the tissues beneath them.

The attenuato-stellate retentive spicula of the interstitial membranes are variable in size, ranging in extreme diameter (from opposite points of their radii) from one fourth to about one third of the diameter of an adult skeleton-spiculum. The radii of the larger ones are few in number and frequently incipiently spinous; comparatively speaking, they are not very numerous. The large fusiformi-acerate spicula of the primary external defensive system are few in number; but, to compensate for their comparative scarcity, those of the secondary system of defensive spicula are exceedingly numerous, and especially so in the large shallow oscular areas. They are pro-

jected beyond the present surface for about half their own length. The network of the skeleton is completely irregular, even immediately beneath the inner surface of the crustular dermis; and, in consequence of the great size of the spicula of which it is composed, the network is large and open. The spicula are all more or less fusiform, and their apices rather bluntly terminated, so much so in some cases as to almost entitle them to be designated as fusiformi-cylindrical. A few large acuate spicula occur intermixed with them.

The connecting spicula correspond in size with those of the skeleton; they are very few in number; some of them have their large ternate apices so deeply imbedded in the crustular mass as to be nearer to its outer surface than to its inner one; but the greater number occupy their usual positions, in close adhesion to the inner surface of the crustular dermis. The component spicula of the ovaria are more than usually delicate in structure, the outer surface of the organ having its reticulations very minute. They are exceedingly abundant in their mature form in the dermal crust; and in the interstitial membranes beneath they may be found in every imaginable stage of development. When seen sideways they appear somewhat oval in consequence of their being slightly depressed; but when viewed with the foramen upward, or directly beneath, they present a regular circular form.

At the first view this species may be readily mistaken for a *Geodia*; but a microscopical section at right angles to its surface immediately removes the false impression.

HYMENIACIDON ANGULATA, Bowerbank. (Plate XLIX.)

Sponge sessile, coating; surface smooth but very uneven, coriaceous. Oscula simple, large, and very numerous. Dermis coriaceous; dermal membrane spiculous, spicula arranged in more or less flat fan-shaped fasciculi, ovo-spinulate, long and slender. Defensive spicula spinulo-multiangulated cylindrical, very variable in size and form, few in number, very minute. Skeleton densely crowded with spicula; spicula ovo-spinulate, variable in size and structure.

Colour in the dried state dark ochreous yellow.

Hab. Madeira (*Dr. Nathaniel Lister*).

Examined in the dried state.

I received eight specimens of this species from Dr. Nathaniel Lister of Madeira, who found them on the rocks at near low-water mark. The largest was 12 inches long, by $7\frac{1}{2}$ inches greatest breadth, and $2\frac{1}{2}$ inches thick; the smallest one was $4\frac{1}{2}$ by $3\frac{1}{2}$ inches, and $1\frac{1}{2}$ inch in thickness. The whole of them agreed very closely in their external characters. In the dried state their surfaces are very uneven, apparently from the effects of contraction in drying.

The oscula are exceedingly numerous and very large; and in one case fully open they measured 8 lines in diameter. In the greater number of the specimens they were mostly closed; but in one the whole of them were open to their fullest extent, giving to the sponge an appearance closely approximating to that of a mass of irregularly

constructed honeycomb. On applying to Dr. Lister for an explanation of this exceptional condition of the specimen, he stated that the specimens in which the oscula were closed were taken from the sea and dried immediately in a shaded place, and that the one in which they were all open was placed about half an hour after removal from the sea in a basin with sea-water sufficient to entirely cover it and was left exposed to the sun. When thus placed, nearly all the oscula were closed; and it was observed by Dr. and Mrs. Lister that a gradual contraction of the closing membranes very shortly commenced, which continued until the whole of the oscula were open to their greatest extent; and in this condition they remained. Dr. Lister also stated that when attached to the rock and undisturbed the oscula were most frequently open, but that if disturbed by being removed from the rock they immediately contracted slowly and became entirely closed. We are familiar with this description of action in *Hymeniacidon celata* and other species of sponges; but there is no one with which I am acquainted that exhibits this vital action on so extended and striking a scale as the species under consideration.

The dermis has a strikingly coriaceous appearance. The dermal membrane is thin and pellucid, and is abundantly supplied with long and slender ovo-spinulate spicula more or less arranged in broad flat fan-shaped fasciculi, in which the bases are all coincident and the apices radiating. There is no difference in size between these spicula and those of the skeleton. The most distinctive character in this species is undoubtedly the very minute but remarkable spinulo-multiangulated cylindrical defensive spicula of the dermal membrane, represented by figure 7, Plate XLIX. It requires great care to obtain these spicula from portions of the dermis by the aid of dissolution of the sponge in boiling nitric acid, but they may be readily seen *in situ* in a thin slice of the dermis, mounted in Canada balsam, with a power of 600 or 700 linear. This is the only case in which I have found this singular form of spiculum *in situ*. The one figured represents the normal form in a fully developed condition; and in such spicula the central canal can frequently be seen. A great number of them are distorted to a very considerable extent; and some are exceedingly attenuated and have the spines very incompletely developed.

The spicula of the skeleton are crowded together on the interstitial membranes without the slightest approximation to order. They are very variable in size, some of them being twice the diameter and length of others; and the ovo-spinulation is equally variable, some of the basal inflations being completely spherical, while others assume every possible variation of the ovoid form.

This species of sponge is interesting, not only on account of the remarkable development of its oscula and their vital powers of action, but also as affording the type form *in situ* of the spiculum represented in plate iii. fig. 72, vol. i. 'Monograph of British *Spongiadæ*,' in treating of the anatomy and physiology of the spicula.

DESCRIPTION OF THE PLATES.

PLATE XLVI.

Fig. 1. The type specimen of *Geodia tuberculosa*, Bowerbank, natural size.
Fig. 2. One of the large fusiformi-acerate skeleton-spicula, magnified 80 linear. This figure also represents a large primary external defensive spiculum.
Fig. 3. A secondary external defensive spiculum, magnified 80 linear.
Fig. 4. One of the patento-ternate connecting spicula of the normal form, magnified 80 linear.
Fig. 5. A large and very fully developed patento-ternate connecting spiculum with the distal terminations of the radii recurved, magnified 80 linear.
Fig. 6. A recurvo-ternate spiculum from immediately beneath the dermal crust, magnified 80 linear.
Fig. 7. A porrecto-ternate spiculum from a short distance beneath the dermal crust, magnified 80 linear.
Fig. 8. One of the minute subsphero-cylindro-stellate spicula from the dermal membrane, magnified 530 linear.
Fig. 9. One of the slender acerate tension-spicula of the interstitial membranes, magnified 80 linear.
Fig. 10. One of the comparatively large attenuato-stellate retentive spicula of the interstitial membranes, magnified 530 linear.
Fig. 11. A large cylindro-stellate spiculum with radii spinous, magnified 530 linear. These spicula are very few in number.

PLATE XLVII.

Fig. 1. The type specimen of *Geodia tumulosa* from Honduras, natural size.
Fig. 2. One of the slender acerate tension-spicula from the porous areas, magnified 80 linear.
Fig. 3. A minute cylindro-subsphero-stellate spiculum from a porous area, magnified 530 linear. These spicula vary to a considerable degree in size and completeness of development; the one figured is a mature one.
Fig. 4. A fully developed attenuato-patento-ternate connecting spiculum, magnified 80 linear.
Fig. 5. An attenuato-patento-ternate connecting spiculum in an early stage of development, magnified 80 linear.
Fig. 6. A fusiformi-acerate skeleton-spiculum, magnified 80 linear.
Fig. 7. One of the tension-spicula from the interstitial membranes, magnified 80 linear.
Fig. 8. One of the comparatively large attenuato-stellate retentive spicula of the interstitial membranes, magnified 530 linear.

PLATE XLVIII.

Fig. 1. The type specimen of *Pachymatisma areolata*, Bowerbank, natural size.
Fig. 2. One of the large external defensive spicula, magnified 80 linear. This form also occurs to a great extent in the skeleton.
Fig. 3. An external defensive spiculum of the secondary series from the dermal surface, magnified 80 linear. These spicula vary to some extent in size and form.
Fig. 4. A skeleton fusiformi-acerate spiculum with very blunt terminations, magnified 80 linear. These spicula vary in their terminations in every degree between figs. 2 and 4.
Fig. 5. One of the large attenuato-stellate retentive spicula of the dermal membrane, magnified 530 linear.
Fig. 6. A fusiformi-cylindrical, incipiently spined minute sphero-stellate retentive spiculum from the dermal membrane, magnified 530 linear.

BIBLIOTECA
CENTRALE



C. Pronk del.

M.& N. Hanhart imp.

PTEROMYS MAGNIFICUS



ZOOLOGICAL MUSEUM

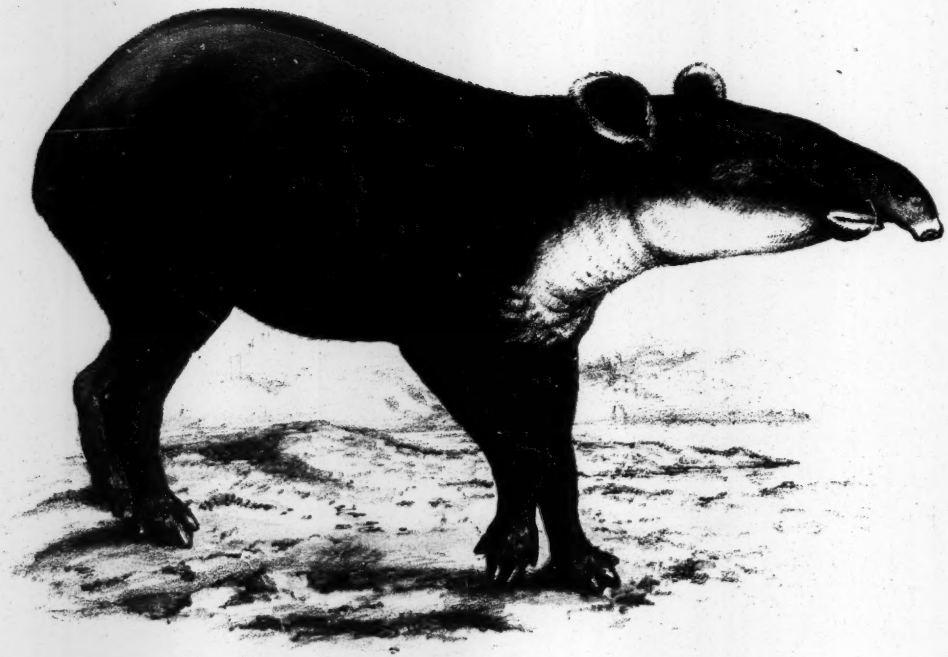


PLATE XLIX.

Fig. 1. The type specimen of *Hymeniacidon angulata*, Bowerbank, natural size.
Fig. 2. A spiculum from one of the fan-shaped groups of the dermal membrane, magnified 150 linear. These spicula vary from the purely spinulate form to the fusiformi-spinulate one of the figure.
Fig. 3. An average-sized ovo-spinulate skeleton-spiculum of about the normal form, magnified 150 linear.
Figs. 4, 5, 6. Varieties of form of the spinulation of the skeleton-spicula, magnified 530 linear.
Fig. 7. Represents an adult and fully developed spinulo-multiangulated cylindrical defensive spiculum from the dermal membrane, magnified 660 linear.

May 21, 1872.

Robert Hudson, Esq., F.R.S., V.P. in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of April 1872.

The total number of registered additions to the Society's Menagerie during the month of April was 131, of which 10 were by birth, 32 by presentation, 77 by purchase, 2 by exchange, and 10 were received on deposit.

The most remarkable of the acquisitions were:—

1. A Red-bellied Flying Squirrel (*Pteromys magnificus*, Hodgson: Jerdon, Mamm. of India, p. 177), purchased April 10th, of a soldier, who informed us that he obtained it at Donglee (*qu.* Tonglee) gulley in the Himalayas. Mr. Berjeau's sketch (Plate L.) will give an idea of the form of this fine species of *Pteromys*, which is quite new to the collection.

2. A young female Baird's Tapir (*Tapirus bairdi*), purchased April 15th, having been brought by one of the Society's correspondents from Corinto, on the western coast of Nicaragua.

This animal, although not by any means full-grown, has nearly lost the spots of immaturity which distinguished our former specimen of this interesting species, received in August last*; and as it also differs from the adult as figured by Dr. Gray (P. Z. S. 1867, pl. xliii.), I have thought it advisable to have a careful figure made of it (Plate LI.).

It stands about 23 inches in height, and is 42 inches long, from the extended snout to the rump. Above it is rather thickly covered with brownish-black hairs of about $\frac{3}{4}$ inch in length. The face is rather paler. The ears, except for a portion of their outer rims, are distinctly margined with clear white. The throat and chest are of a sordid white.

The present dentition of this animal consists of six well-developed incisors above, and six below; and two upper canines appear to have

* See P. Z. S. 1871, p. 626, pl. 50.

recently cut the gum. I could not manage to examine the molars; but they are certainly present.

The drawing of the ordinary *Tapirus terrestris* (Plate LII.), which I also exhibit, represents our adult female specimen of this species, purchased July 30, 1869, and still living in the Gardens. It will serve to show the external differences between the two allied species.

3. A pair of Rhinoceros Hornbills (*Buceros rhinoceros*), purchased April 13th.

The following extracts were read from a letter addressed to the Secretary by Dr. G. Bennett, F.Z.S., dated Sydney, March 21, 1872:—

"A pair of living *Didunculi* (said to be male and female) arrived at Sydney on the 6th of February from the Island of Upulu (Samoan or Navigator Islands). One was a fine well-grown bird in excellent plumage; the other was a smaller bird in poor condition, and was probably a younger bird; they were both placed in the aviary of the Botanic Gardens: the latter bird died on the 2nd of March, apparently from an injury of the head accidentally received; I have placed it in spirits for a skeleton. I would have secured and sent both these birds to the Society; but, unfortunately, Broughton in the 'Parramatta' (to whom only I could have intrusted such delicate birds) had sailed early in the morning, on the day of their arrival, so that so desirable an opportunity was lost. At present the surviving bird is in the aviary, in a large wire enclosure together with Nicobar, Wonga, and other Pigeons; it is very lively, in excellent health and plumage, and feeds almost exclusively on yams and hemp-seed, and occasionally amuses itself by chasing and assuming a mastery over the other Pigeons, but does not appear to injure them.

"If a favourable opportunity occurs and the bird survives, I will purchase and send it to the Society. We have in the aviary the Weka (*Ocydromus australis*), 'Wood Hen' (*O. sylvestris*), and the New-Caledonian Rail (*O. lafresnayanus*), all of whom we find to be excellent rat-catchers, more especially the two former species.

"The Red-billed Curassows (*Crax carunculata*) have been permitted to roam about the gardens, and eventually built a nest in one of the trees, and hatched two young birds, now seven weeks old (March 10th). They walk about with the mother, feeding upon berries of various kinds, and appear very fond of acorns, which are strewed under the English oaks in the gardens; these birds are quite domesticated, and wander about the grounds, not in the least intimidated by the numerous visitors.

"We have a curious hybrid Pheasant, a cross between the male Reeves's and a female of the Ring-necked Pheasant; it is a large-sized and fine bird, larger than either of the parent birds, and the mottled plumage has a very remarkable appearance.

"A living specimen of the little Penguin (*Spheniscus minor*) was captured near Sydney, on the 3rd of March; it only survived a few days. These birds are rare so near Sydney."



TAPIRUS TERRESTRIS, L. sp.
(ex specimine vivo)



NANOTRAGUS PYGMÆUS

The following papers were read:—

1. On the Royal Antelope, and allied Species of the Genus *Nanotragus*. By Sir V. Brooke, Bart., F.Z.S.

[Received May 21, 1872.]

(Plate LIII.)

I have the pleasure of exhibiting to the Society three adult and very perfect specimens of *Nanotragus pygmæus*, the smallest of the Pecora at present known to science. These specimens I received a short time ago from His Excellency Governor Ussher of Cape-Coast-Castle, West Africa, a gentleman who has already proved himself one of the best friends zoological science possesses in a country still doubtless rich in matters of interest to the naturalist. As regards the nomenclature of this Antelope, the complications and difficulties of its synonymy, extending as it does over a period of upwards of 150 years, equal, and perhaps exceed, those connected with any of the species contained in the extensive group of which it is, as I have said, the smallest representative. But not only is it with respect to its literary history that the species under consideration is involved in some obscurity; partly in consequence of mistakes arising from this source, and partly on account of the paucity of accessible specimens, the natural affinities of the species appear to me to have been somewhat overlooked. I will therefore divide the remarks which I have to offer on this Antelope under two heads, giving first those that concern its synonymy, and secondly those that relate to its natural affinities.

I. *Remarks on the Literary History and Synonymy of* Nanotragus pygmæus.

Professor Sundevall, in his well-known treatise on the Pecora, published in the Swedish Academy's 'Proceedings' for 1847 (p. 303), enters most carefully into an examination of this subject, and, with the exception of one point, seems to have most successfully unravelled the mazes with which it was surrounded. In order to clear up this single point I shall now describe what, after very careful investigation of the matter, I believe to be the history of the species as connected with Linnæus himself, and shall then specify in what respect this account differs from that given by Professor Sundevall.

Bosman, in his travels in Guinea in 1703, so far as I have been able to ascertain, is the first author who mentions the species. At page 249, after describing the colour and very small size of the animal, the feet being made into pipe-stoppers, one of which, he states, he sent home set in gold, Bosman writes, "the negroes here call it the King of Harts:" thus, no doubt, originated the English name of Royal Antelope, by which this species has always been known.

The 'Thesaurus' of Seba, published in 1734, gives us the first substantial record of specimens having found their way into Euro-

pean museums, figures 1 and 3 of plate 43 and the drawings of feet set in gold being, as I shall endeavour to show presently, undoubtedly referable to the little Royal Antelope. In 1754 the Museum of Adolphus Frederick appears to have contained additional materials for the consideration of Linnæus; and it is in his catalogue of this collection that he first gives a definite name to the species. As far, therefore, as record serves us, the two chief, probably the only sources from which Linnæus derived his knowledge of the species were, first, the 'Thesaurus' of Seba, with possibly, as Prof. Sundevall suggests, an examination of Seba's collection, and, secondly, the Museum of Adolphus Frederick. In the 2nd edition of the 'Systema Naturæ' (1740), six years subsequent to the publication of the 'Thesaurus,' Linnæus first mentions the species; we there find the diagnosis "*Capra pedibus digito humano angustioribus*," with reference to plate 43. fig. 3 of the 'Thesaurus.' In the 6th edition of the Syst. Nat. (1748), this diagnosis and reference are repeated word for word. In 1754 Linnæus wrote his catalogue of the collection of Adolphus Frederick, and in it gives new information derived from new sources. He describes a specimen in that collection in the following manner (p. 12):—"Feet scarcely thicker than a penholder; colour grizzly; the size of a cat; neck rather ashy; underneath the following parts are white—the tail, throat, abdomen, breast, and inner thighs; ears ovate and rather naked." To his description he appends the diagnosis which I have given above from the 6th and 7th editions of the 'Systema Naturæ,' referring still to Seba's plate 43. figure 3, and proposing for the species the name of *Capra perpusilla*. In this catalogue, however, at the same page, Linnæus mentions, under the name of *Cervus guineensis*, a specimen the diagnosis of which in no way agrees with his *Capra perpusilla*. He thus describes it:—"From Guinea; of a greyish colour, *underneath blackish*; size of a cat; a streak between the ears and a spot over the eye black; throat on both sides longitudinally black; chest black in the middle, a dark line running along the flanks as far as the tarsal joint; a blackish line from the anus to the tarsal joints; anterior surface of the fore limbs as far as the carpal joint black, and a narrow black line drawn to the feet; ears rather long; tail underneath black; tibiæ double as thick as those of the next species" (viz. *Capra perpusilla*). The existence of these dark markings so carefully described clearly indicate a wide distinction between this specimen and that which supplied the diagnosis of the species immediately following in the catalogue, in which no dark markings are mentioned—the throat and underparts described as *black* in *C. guineensis*, being, on the contrary, in *C. perpusilla* described as white. The purity of this colour is, as may be seen in the specimens before the Society, most characteristic of the Royal Antelope. In the 10th edition of the Syst. Nat., published four years after the Catalogue, as is not a little remarkable, Linnæus, regardless of the name *Capra perpusilla* given in his former publication, gives to the same species the new name of *Capra pygmæa*; nor does he enlarge his diagnosis, merely bringing down

that of his 2nd and 6th editions. He, however, introduces for the first time in this edition *Cervus guineensis* of the Catalogue of Adolphus Frederick, with the short diagnosis "*C. griseus, subtus nigricans.*" In the 12th edition (1766) we find collected under the name of *Moschus pygmæus* all the allusions to this species in the early editions of the 'Syst. Nat.,' with still no mention of the collection of the king; but here, for the first time, Linnæus refers figs. 1 and 2 of Seba's plate 43 to this species. The diagnosis of *Cervus guineensis* is brought down unaltered from the 10th edition.

My interpretation of this complicated and difficult subject is as follows. I believe that two perfectly distinct species were the types of the *Moschus pygmæus* vel *Capra perpusilla* and the *Cervus guineensis* of Linnæus. The type of the former I believe to have been a genuine specimen of the Royal Antelope, which specimen is represented in fig. 3, plate 43, of Seba's 'Thesaurus.' The débris of Seba's collection, as Temminck at page 203 of his 'Esquisses Zoologiques' informs us, was received by him at Leiden about 50 years after Seba's death. Amongst the remnants of this collection Temminck discovered a very young specimen of his *Nanotragus spiniger*, discoloured and hardly recognizable, but still in sufficiently good condition to admit of its being set up and placed in the Leiden collection. From the rarity of specimens, and the exact correspondence of Temminck's description of this specimen with fig. 3 of plate 43 of the 'Thesaurus,' it is almost certain that this is the identical specimen represented in the drawing; if so, it is clear that a true specimen of the Royal Antelope was the type of *Capra perpusilla* of the Catalogue, and therefore of the *Moschus pygmæus* of the 12th edition of the 'Systema Naturæ.' A consideration of the history of the specimens contained in the collection of Adolphus Frederick throws additional light upon this conclusion. This collection, Prof. Sundevall tells at page 304, *l. c.*, passed entire to Stockholm. In a bottle which Prof. Sundevall tells us he failed to examine sufficiently carefully during the preparation of his first treatise in 1844, he found in 1846 a veritable specimen of the Royal Antelope, in size and form so similar to Seba's fig. 1, plate 43, that he could have believed it to have been the type of that figure. In the fact of this undoubted specimen having passed under the investigation of Linnæus we have still further grounds for believing that the species described by him under the name of *C. perpusilla* in the Catalogue, and of *Moschus pygmæus* in the 12th edition of the 'Systema Naturæ,' to both of which fig. 3, plate 43, of the 'Thesaurus' is referred, was undoubtedly the species under consideration, the Royal Antelope. The type of *Cervus guineensis* seems to me to be equally certain. Agreeing in every detail with the description given in the Catalogue we find fig. 2, plate 43 of the 'Thesaurus.' At page 301 Prof. Sundevall expresses his opinion that nothing at all answering to the description of *C. guineensis* was to be found in the Drottingholm collection; but at page 304 he says that in the same bottle as that in which he discovered the young male of *Nanotragus spiniger* he also discovered a specimen exceedingly

similar to this very figure; and this figure, as I have said above, resembles in every detail the minute description given by Linnæus of his *Cervus guineensis*, the dark belly and markings, which are well shown in the drawing, distinguishing it from the two other figures in the same plate (43), one of which (fig. 3) I have endeavoured to show is the type of the *Moschus pygmæus* of Linnæus. It seems to me clear therefore that the description of *C. guineensis* given at page 12, in the Mus. Adolph. Frid., was founded on this specimen,—Linnæus being at the time strengthened in his opinion of the distinctness of the species by finding two drawings (fig. 2, plate 43, and fig. 1, plate 44) in Seba's 'Thesaurus' closely resembling the doubtless very immature specimen submitted to his inspection in the king's collection.

It is not, however, so plain what species was represented by *Cervus guineensis*; indeed I think it would be almost impossible to form any conjecture upon this subject. There is not only the difficulty of selecting amongst the large number of species of *Cephalophi* found on the west coast of Africa; but, at the time Linnæus wrote, vast confusion existed between this group and the two widely distinct groups, the *Tragulinæ* and the *Moschi*. It would therefore, I believe, be impossible to determine to what exact species this diagnosis belongs, bearing as it does strong traces of having been founded on a very immature and imperfect specimen.

There is much that leads me to the conclusion that Linnæus himself became gradually convinced that his diagnosis rested upon insufficient grounds; and I find in his own copy of his 12th edition, preserved in the library of the Linnæan Society, he has drawn his pen through this diagnosis, as if to erase it from his work; and in Gmelin's edition of the 'Syst. Nat.' the species is not mentioned. On the whole, I think the circumstances do not admit of the interpretation deduced from them by Prof. Sundevall, who, at page 301, expresses his opinion that *Cervus guineensis* "was founded on some error," and considers it probable that under that name Linnæus described the large specimen of *Nanotragus pygmæus* which subsequently went to Stockholm with the Drottingholm collection, mixing and comprising with this description "some other notes taken from another source," possibly from Seba's fig. 1, plate 43, "adding also notes retained in his memory from an examination of *Tragulus javanicus*."

On the contrary, as I have explained above, I consider *C. guineensis* to have been founded on a young specimen of some small species of Antelope, not now to be ascertained, but clearly distinct from the *Moschus pygmæus* of Linnæus.

Subject to this exception, Professor Sundevall's elaborately worked-out synonymy of this species appears perfect; and with this alteration it will stand thus, the earliest specific name to be adopted being that of Linnæus, in the 12th edition of the 'Systema Naturæ":—

NANOTRAGUS PYGMÆUS. (Plate LIII.)

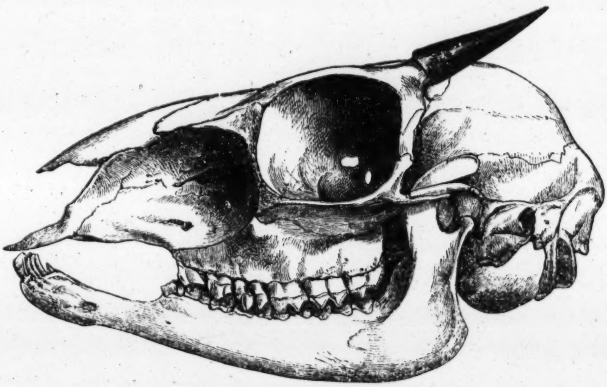
1703. *Très-petit Cerf*, Bosman, Guinea, pp. 236, 252.

1734. *Cerva parvula* (part.), Seba, Thesaurus, pl. 43. figs. 1–3 A, B.
1740. *C. pedibus digito* &c., Linn. Syst. Nat. 2nd edit.
1754. *Capra perpusilla*, Linn. Mus. Adolph. Frid. p. 12.
1758. *Capra pygmæa*, Linn. Syst. Nat. 10th edit.
1764. *Chevrotain* (part.), Buff. Hist. Nat. vol. xii. p. 341, pl. 43. figs. 3–6.
1766. *Moschus pygmæus*, Linn. Syst. Nat. 12th edit. p. 92.
1767. *Antilope pygmæa*, Pallas, Spic. Zool. fasc. xii. p. 18.
1771. *Royal Antelope*, Pennant, Syn. Mamm. pp. 28, 19.
1777. *Antilope regia*, Erxl. Syst. Règ. An. p. 278.
1781. *Royal Antelope*, Penn. Hist. Quad. p. 72.
1789. *Moschus pygmæus*, Gm. Syst. Nat. i. p. 173.
1806. *A. pygmæa*, Turt. ed. Syst. Nat. p. 115.
1820. *Moschus pygmæus*, Desmarest, Mamm. p. 428.
1829. *A. pygmæa*, Fisch. Syn. p. 469.
1835. *Antilope spinigera*, Temm. Monogr. Mamm. i. p. xxx (desc. nulla).
1844. *Nanotragus spiniger*, Sund. Pecora, p. 191.
1847. *Nanotragus spiniger* vel *perpusillus*, Sund. Pec. App. ii. p. 308.
1850. *Nanotragus regius*, Gray, Knows. Menag. p. 12.
1850. *Nanotragus perpusillus*, Gray, P. Z. S. p. 126.
1852. *Nanotragus perpusillus*, Gray, Cat. Mamm. Brit. Mus. p. 89.
1853. *Calotragus spiniger*, Temm. Esq. Zool. p. 201.
1855. *Antilope spinigera*, Wagn. Säugeth. p. 416.

II. *Remarks on the Natural Affinities of* N. pygmæus.

The following important characters connect *N. pygmæus* with seven or eight species which together form a natural group, the value of which appears to me to be substantially not more than generic.

Horns rising immediately above the postorbital process of the frontal bone, and well in front of the fronto-parietal suture, which is nearly straight. Suborbital fossa large, suddenly pressed in before the orbit, and extending forward along the superior maxillary. Anteorbital vacuity present but small. Brain-case considerably prolonged backwards. Auditory bulla large and smooth externally, no septa internally. The portion of the tympanic bone which forms the external auditory meatus (owing to the large size of the bulla) coils back upon itself with a remarkably shell-like whorl. Paroccipital process pressed against the posterior wall of the bulla, a considerable portion of the mastoid being visible externally between the posttympanic process of the squamosal and the paroccipital; basioccipital raised into a low median ridge, with two imperfectly developed anterior tubercles. Nasals of moderate length. Crown of the head smooth; naked portion of the muzzle small. False hoofs small or absent. Duct, or ducts, for the escape of the secretion of the suborbital gland small in comparison with the size of the gland.



Skull of *Nanotragus pygmæus*.

These characters are common to the following genera of other authors, which I give below with the dates of their creation :—

1844. *Nanotragus*, Sund. Vet. Akad. Handl. p. 191. Type *N. spiniger*.

1846. *Calotragus*, Sund. Vet. Akad. Handl. p. 192. Type *A. tragulus*, Licht. Berl. vi. p. 176 (1814).

1846. *Scopophorus*, Gray, Ann. & Mag. Nat. Hist. p. 232. Type *A. scoparia*, Schreb.

1846. *Nesotragus*, Von Düben, Vet. Akad. Œfvers. p. 221. Type *N. moschatus*, Von Düb.

1846. *Oreotragus*, Gray, Ann. & Mag. Nat. Hist. p. 231. Type *O. saltatrix*.

I therefore propose to unite these genera under the common title of *Nanotragus*, and to regard the minor sections as of subgeneric value only. The groups would then be arranged as follows :—

a. No false hoofs, no knee-brushes. (*Nanotragus*.)

Nanotragus pygmæus, Linn. Guinea.
—— *moschatus*, V. Düb. Zanzibar, E. Africa.
—— *tragulus*, Licht. S. and E. Africa.

b. False hoofs and knee-brushes present. (*Scopophorus*.)

Nanotragus scoparia, Schreb. S. Africa.
—— *montanus*, Rüpp. N.E. Africa.
—— *hastatus*, Pet. Mozambique.

c. False hoofs present, knee-brushes absent. (*Oreotragus*.)

Nanotragus melanotis, Thunb. S. Africa.
—— *oreotragus*, Schreb. N. & S. Africa.

Very closely allied to this group is the little *Antilope saltiana* of North-eastern Africa; but for the present, until an opportunity occurs for examining this species alive or in a fresh state, I think it evinces sufficiently important characters to make it safer to leave it in a distinct genus, characterized from *Nanotragus* by having the crown of the head tufted, muzzle hairy, præmaxillæ long, reaching to the lacrymals, nasal bones very short, mesethmoid strongly ossified. The posterior true molar in the lower jaw possesses but two lobes instead of three, as is the case with all other Pecora. The characters of the nasal region, from their singular resemblance to those of *Saiga tatarica*, render it probable that these parts will upon examination be found much modified. A well-marked tentorial ridge extends along the periotic bone, projecting forward in a prolonged point on each side of the pituitary fossa. From *Cephalophus Nanotragus* may be distinguished by the following characters peculiar to the former genus:—

Crown of the head tufted. Apertures of the suborbital gland minute, extending in a line along the cheek; muzzle large. Horns placed so far back as to arise from a process of the frontal bone which projects into the parietals. A distinct septa divides the interior of the auditory bulla into two distinct chambers, the posterior of which occupies the part of the bulla posterior to the external auditory meatus. The number of rib-bearing vertebræ in *Cephalophus*, in all the species of which I have been able to examine the skeletons, is fourteen, whereas thirteen appear characteristic of *Nanotragus*. Professor Sundevall, in his diagnosis of his genus *Nanotragus*, denies to the Royal Antelope the possession of suborbital glands. This mistake probably arose from the examination of dried skins, in which, from the exceedingly small size of the apertures of the ducts, the presence of the gland might not be suspected. The accompanying drawing (see fig. p. 642) and the specimens, however, show this gland to be of enormous size in *Nanotragus pygmæus*. None of the Cavicornia possessing canines, it may be worthy of remark that the skull of one of the males exhibited shows on one side this tooth in a rudimentary condition. A specimen of *Alcelaphus bubalus* with a similar growth has passed under my notice.

2. Notes on the Anatomy of the Huia Bird (*Heteralocha gouldi*). By A. H. Garrod, B.A., F.Z.S., Prosector to the Society.

[Received May 3, 1872.]

A living specimen of *Heteralocha gouldi* (*Neomorpha gouldi*, Gould, B. of Australia, iv. pl. xix.) was obtained by the Society on May 18th, 1870, as was announced by Mr. Sclater in the 'Proceedings,' 1870, p. 383. It died on the 28th of February, 1872, in a much emaciated condition, but without organic disease.

The following notes relate to its anatomy, and may, I trust, assist in enabling its affinities to be more easily determined.

Pterylosis.—The arrangement of the feathers is completely passerine. The rhombic saddle of the spinal tract does not enclose any ephippial space, therein differing from the Crow's and resembling the typical Starling's. There are nineteen remiges, of which ten are on the hand; they increase in size up to the fifth. The rectrices are twelve in number. The oil-gland is nude.

Tongue.—Simple, horny, one third the length of the beak. It forms a flat elongated triangle, slightly bifid at its apex, and a little prolonged backwards at its lateral borders, enclosing a curved line for the base, the concavity being backwards and carrying retroverted papillæ.

The mucous membrane of the palate extends forward as far as the middle of the tongue; that of the mandible goes a little further.

At the angles of the mouth, just below the eyes, are two yellow oval cutaneous expansions, fixed in front and free at their borders elsewhere; they appear as if they were prolongations outwards of the mucous membrane of the angles of the mouth, which had been reflected backwards—they being continuous in front, round the margins, with the mucous membrane.

Syrinx.—As in *Corvus* and most of the Old-World Passerines.

Intestines.—The gizzard is well developed. The intestines are 16 inches long, with the bile-ducts $2\frac{1}{2}$ inches from the gizzard. The cæca are one inch from the cloaca and $\frac{1}{4}$ inch long, being cylindrical.

Arterial System.—There is one carotid artery, the left.

Foot.—The hind toe is slightly longer than the middle anterior toe. In arrangement the tarsal scutes are similar to those of *Corvus* and most Passerines. Their colour is blue-black.

Skull.—The palate (fig. 2) is strictly ægithognathous; that is, the vomer is truncate in front abruptly, and cleft behind; the postero-external angles of the palatines are produced; the maxillo-palatines are slender, and approach towards but do not unite with one another, nor with the vomer, which they partly embrace. There is no ossification in the nasal septum anterior to the vomer.

The whole cranial configuration (fig. 1) closely resembles that of *Sturnus*; but the mandible, instead of being bent upwards, is straight. Like it, the palatines are narrow and approximate; the antero-internal angles of the posterior portions of those bones are reduced and rounded off, as is sometimes the case with *Sturnus* (Mus. Roy. Col. Surg. No. 1539, Ost. Coll.). The vomer is completely truncated in front, and is not prolonged forwards at its external angles, as in *Corvus* and its allies.

The zygoma is not so slender as in *Sturnus*; but the curves are similar. The articular surfaces on the quadrate bone for the mandible are proportionally very large.

The anterior extremities of the pterygoid bones articulate with the sphenoidal rostrum much as in *Corvus*, meeting in the middle line behind the posterior extremities of the palatines for a short distance.

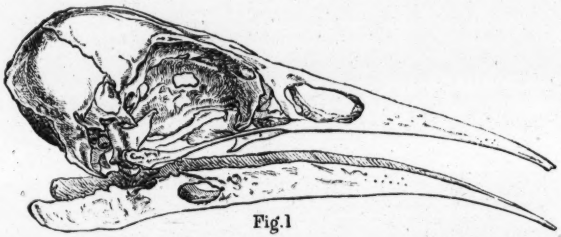


Fig.1

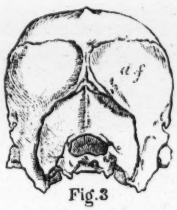


Fig.3

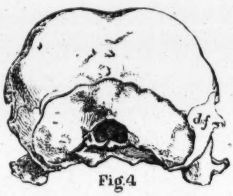


Fig.4

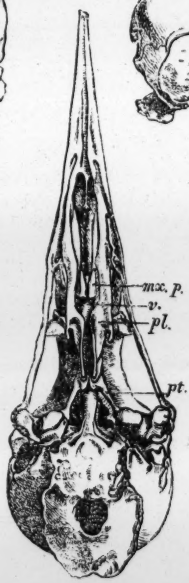


Fig.2

Fig. 1. Skull of *Heteralocha gouldi*, lateral view.
2. Skull of *Heteralocha gouldi*, inferior view.
3. Skull of *Heteralocha gouldi*, posterior view: *d.f.* digastric fossa.
4. Skull of *Corvus frugilegus*, posterior view: *d.f.* digastric fossa.

The maxillo-palatines in their approximate portions are shorter from before backwards than in *Sturnus*, and much resemble those of *Corvus*.

The antero-inferior processes of the orbit are large and spongy; they almost touch the zygoma. But the most characteristic portion of the skull of *Heteralocha* is the occipital region; and in this it presents a great exaggeration of the peculiarities of *Sturnus* and its allies.

In *Corvus* (fig. 4) and most Passerines the digastric muscles occupy a narrow space intervening between the auditory meatus and the mass of occipital muscles, not extending so high up the skull as the latter. The occipital ridge encloses a space elongated from side to side and of but little depth.

In *Sturnus* the digastrics are much broader, and they narrow the occipital space; they also extend up the skull to so great an extent that they nearly meet in the middle line above the origin of the biventres cervicis muscles; but in *Heteralocha* (fig. 3) they are of still greater size, and meeting above the middle line they form a strong ridge, which extends for some distance into the parietal region vertically. This peculiar development of these muscles produces a corresponding change in the shape of the space enclosed by the occipital ridge. In *Heteralocha* it is almost circular, and it extends some way above the foramen magnum. In *Sturnus* there is an approximation to this condition.

A vertical parieto-occipital ridge in many other birds closely resembles that of *Heteralocha*; but it is the median limit of the temporal fossa in most.

Correlated with this extensive digastric origin is a large surface for its insertion. The angle of the mandible (see fig. 1, p. 647) is prolonged directly backwards for this purpose, in a manner unique among Passerine birds, but well seen in the *Anatidæ*. In *Sturnus* the angle of the mandible is slightly prolonged backwards for a similar purpose.

In comparing the skulls of others of the *Sturnidæ* the following is a graduated series, based on the development of the digastric fossæ in those birds I have had the opportunity of examining, commencing with *Heteralocha* and ending with *Corvus*.

Heteralocha.	*Quiscalus*,
Sturnella.	*Cassicus*.
Sturnus.	*Acridotheres*.
Icterus.	*Pastor griseus*.
Pastor ialla.	*Molothrus*.
Gracupica.	*Corvus*.

The palates in most of these birds were not in a fit condition for study; and, as will be clearly seen, geographical range has not been attended to.

In the sternum, *Heteralocha* differs in no important point from *Sturnus*, except that the posterior notches tend to be converted into foramina, as observed by Mr. Eyton in his 'Osteologia Avium.'

The following muscles were dissected, and found to agree precisely with the corresponding ones in a Rook.

Pectoralis major.	Sartorius.
Pectoralis minor.	Semimembranosus.
Coraco-brachialis longus.	Semitendinosus.
Coraco-brachialis brevis.	Adductor magnus.
Tensor patagii longus.	Biceps.
Tensor patagii brevis.	Femoro-caudal.

In conclusion, it may be stated that the anatomy of *Heteralocha* shows clearly that it is truly Passerine, and not related to *Upupa*, as was previously supposed by most authors*. When examined more in detail, its relation to the *Sturnidæ* is found to be very intimate, and its structure is clearly not closely allied to that of the *Corvidæ*. In its relation to *Sturnus* it seems to present an exaggeration of the peculiarities of that bird, which would place it at the head of the family.

3. Observations on the Birds of St. Lucia. By the Rev. J. E. Semper, Colonial Chaplain. With Notes by P. L. Sclater.

[Received April 20, 1872.]

Mr. Semper having kindly sent to me, through our Corresponding Member, Mr. G. W. Des Vœux, a second collection of birds from St. Lucia, together with a series of notes on their habits, I have great pleasure in offering to the Society a second communication on this subject, supplementary to that already published in our 'Proceedings'†.

I will first give Mr. Semper's notes on the species enumerated in my former list, and then state the additional species contained in the present collection, with Mr. Semper's notes on them.

a. *Species contained in former list.*

1. Margarops herminieri, *l. s. c.* p. 268. (*Molvie*, or *Mauvie*.)

This bird is counted as one of our game birds, and is killed in large numbers from August to January yearly. About October to December these birds are found in large numbers in flocks feeding on the berries of certain trees; but for the remainder of the year they are dispersed in pairs, and become very poor. They breed about April or May, the female building a nest of dried leaves, twigs &c. on a bush or low tree, laying two eggs of a blue-green. They take very little shot to kill them.

* Mr. G. R. Gray has placed *Heteralocha* in the *Sturnidæ* in his 'Hand-list of Birds.'

† See P. Z. S. 1871, p. 263.

2. MARGAROPS MONTANUS, *l. c.* p. 268. (*Grivotte* or *Grevotte.*)

This also is counted amongst amongst our game birds. It is in season at the same time and feeds on the same berries as No. 1, becoming at the height of the season a mere lump of fat. It is a much more common bird than No. 1, and it is to be found scattered about the half-cultivated part of the country all the year round. It is an inquisitive bird, standing with head on one side, tail elevated, and wings drooping and trembling, chattering and peering at the passer-by, until it sees signs of danger, when it quickly flies off to a small distance to repeat its motions. They are vigorous birds, and contain a great deal of blood for their size. I have met individuals of this species who have fairly impaled themselves on sharp sticks when flying through the bushes.

3. RHAMPHOCINCLUS BRACHYURUS, *l. c.* p. 268. (*Gorge-blanc.*)

This bird seems to be strictly insectivorous. It is constantly to be met with in pairs, or in small mobs of four or five pairs, busily searching amongst the bushes near the ground and in low trees.

I have seldom observed it at any great height, nor does it seem to indulge in long flights. It is an inquisitive noisy bird, and, on seeing any thing larger than itself passing by, will stand head and tail elevated, wings drooping, and with open mouth keep up a constant warning chatter, and throwing itself about in all sorts of contortions. When a mob of them act thus together, as they often do, the scene is an amusing one to the passer-by, and useful, as it often indicates the presence of a snake or of game.

4. CINCLOCERTHIA MACRORHYNCHA, *l. c.* p. 268. (*Le Trembleur.*)

Another insectivorous bird, constantly at work creeping about the trunks and larger limbs of trees searching for its food. They are generally met with in pairs. The bird obtains the name of "*Le Trembleur*" from its constant quivering and shaking, as though suffering from an ague-fit. About March and April I have heard individuals of this species, I suppose males, give utterance to a lively and pleasing song, extending to some three notes on the scale; at other times they are silent, with the exception of a call-note to each other, and a scream or warning cry when hurt or frightened.

5. MIMUS GILVUS, *l. c.* p. 268. (*Grieve blanc.*)

This bird is said to be a recent immigrant into St. Lucia, where, however, it is now plentiful; it keeps to the open ground near roads and cleared lands, generally seen in pairs. Their song, though not very pleasant, is varied; and they seem often to be trying to imitate the cries and notes of other birds. I have never met with it in the woods.

6. Dendrœca adelaidæ, *l. c.* p. 269. (*Sucrier gran-bois.*)

A rather shy little bird, generally found in pairs in the underbrush busily searching about, apparently for insects.

7. Vireosylvia calidris, *l. c.* p. 269. (*Mabelle.*)

A berry-eater, found scattered about in pairs.

8. Certhiola martinicana, *l. c.* p. 269. (*Sucrière.*)

A fruit-eater, found throughout the island, generally in pairs; there is little, if any, outward and striking difference between the sexes. It is far from being shy of man, as it will come into the house to sip water or plunder fruit &c., and is often to be met with in the sugar-houses, regaling itself on the sweets there. It has a pleasing little song, though feeble and of little compass. I have often seen it in my gallery sipping honey, or catching insects from the flowers there, or bathing in the dog's water-dish, and tantalizing the cat, who can seldom manage to catch one, they being active and wary as well as bold.

9. Myiadestes genibarbis, *l. c.* p. 269. (*Siffleur montaigne.*)

Generally found in the virgin forest or near it, a shy retired bird, more often heard than seen; they do not seem to pair very strictly. Their note is a succession of whistles, three short and full, in rapid succession, followed after a short interval by a long sustained note a semitone higher, dying away into silence. In the woods, when several of them are about, they seem to be calling out to each other at a distance, and answering on all hands, so that the collector is often at a loss which bird to follow; by imitating their note, however, with a little patience, they generally can be induced to show themselves. Their food seems to be principally small snails; at least I have generally found such in their throats or crops. They are fond of cool shady places on the hills and high lands.

10. Saltator guadelupensis, *l. c.* p. 270. (*Grosbec.*)

Much hated by the labourers, as it has the reputation of being very destructive to the pigeon- or Angola-pea.

11. Loxigilla noctis, *l. c.* p. 270. (*Père-noir.*)

The female of this bird is totally distinct in colour from the male, she being of an almost uniform green, whilst he is black, with a crimson gorget. They are generally met with in pairs, and have the reputation of being destructive to sugar-canes. It is said the bird will dig out a small hole in a cane, so as to get at the soft sweet pith, and this wound destroys the cane.

12. Icterus laudabilis *, *l. c.* p. 270.

Another reputed sugar-cane destroyer. Very little if any differ-

* In the present collection Mr. Semper sends a specimen of what he calls the "*Dusky Carrouge*," with the following note:—

"The only one of the kind I have seen. At first I took it to be a young bird

ence observed between the male and female; they generally keep in pairs, though sometimes small mobs of eight or ten may be seen. Birds of the first year have merely a foreshadowing of the beautiful plumage of the older birds.

Their nest is said to be formed by fastening together the two sides of a leaf of the banana, and then building on this foundation.

13. Quiscalus lugubris, *l. c.* p. 271. (*Merle.*)

The commonest bird in St. Lucia—that is to say, in the cultivated and inhabited parts of it. This bird is seldom or never seen but in the neighbourhood of cultivation. It is a sort of general scavenger, eating any thing that comes to hand. The male is of a rich glossy bluish black, the female of a sombre brown; the birds of under one year resemble the adult hens. They pair, but not strictly, and during the day are scattered about foraging; towards evening small companies of them may be seen making for a general sleeping-rendezvous in a tall tree, or cluster of small trees (they seem to prefer the cabbage-palm for the purpose), where several hundreds will meet to roost. About sunset, or a little after, the whole assemblage keeps up a chirping and chattering for some minutes, during which time stragglers may be seen hastening to join the assemblage; just about daybreak the same musical entertainment is repeated, after which the assembly disperses for the daily search for food, &c. The people here say that the Merles thus hold their morning and evening prayers.

These birds build a large nest of vegetable fibres, leaves of canes and grasses, on some large bushy tree, numbers on the same tree. April and May is the season for breeding with them, as, indeed, it is for most of the birds here. The male Merle during its flight, and at times when courting, carries his tail in a very peculiar manner, forming an angle with the body, either to right or left; and a cross section of the tail then forms a wedge or angle, so that at first sight the tail seems to be out of joint and injured.

14. Elainea martinica, *l. c.* p. 271.

Not recognized. Country name not given.

15. Myiarchus latirostris, *l. c.* p. 271. (*Gobemouche solitaire.*)

Met with in quiet cool shady places in the woods.

16. Myiarchus erythrocercus, *l. c.* p. 271. (*Pipperie Gran-bois.*)

Generally found in pairs in the woods.

---

of *Icterus laudabilis*, but, on preparing it for stuffing, found in its ovary a fully developed egg. This specimen was obtained at Micond, on the east coast of the island; and the bird is said to be common enough there."

On examining this specimen carefully I have come to the conclusion that it is merely a young female of *Icterus laudabilis* breeding in immature plumage. This is, we know, the case in many species in which the sexes, when perfectly adult, are alike in plumage.—P. L. S.

17. Tyrannus rostratus, *l. c.* p. 272. (*Pipperie.*)

Takes its name from its cry, which somewhat resembles it. The *Pipperie* affects open land, also the undergrowth or rustrojo which springs up in abandoned clearings. Its favourite position is perched on an elevated dry twig, whence it makes frequent swoops after insects.

18. Eulampis jugularis, *l. c.* p. 272. (*Bronze-winged Humming-bird.*)

The largest of our Humming-birds; no difference observed between the appearance of the sexes.

19. Eulampis holosericus, *l. c.* p. 272. (*Emerald Humming-bird.*)

Builds a nest of vegetable down, moss and lichens, on any greyish-barked branch or twig.

20. Orthorhynchus ornatus, *l. c.* p. 272. (*Gold-headed Humming-bird.*)

A lively fearless little fellow, will come within a yard of a quiet spectator to suck honey &c. from flowers, or to sip water. When at rest, often elevates his golden crest, which then, however, appears to less advantage than when it is kept flat; when elevated, the crest looks like a number of large pins in a pincushion; but when flat, and in a favourable position, the crest looks like a button of polished gold. During its flight, or when hovering about a flower, the effect is very pretty, as the golden appearance of the crest is presented or withdrawn with every change of the bird's position. The female is a trifle smaller than the male, and duller in colour. She builds a nest of vegetable down close down in a cluster of leaves, so that it is seldom seen. When sitting she is very bold, and will dart at the face of an intruder. I have never known her actually to strike; but she will come within a couple of inches of one's face. All these humming-birds possess extraordinary powers of flight. Besides their hovering and ordinary mode, they have a flight when alarmed of extreme rapidity, so rapid that the eye can scarcely follow them.

21. Crotophaga ani, *l. c.* p. 273. (*Merle Corbeau.*)

The *Merle Corbeau*, or *Keel-bill*, of which I forwarded a couple of specimens, is rather a recent immigrant to St. Lucia. It is insectivorous, and keeps together in small flocks. In Trinidad and Demerara, where they are more plentiful, they may be seen perched on the back of cows and mules in the pastures, picking off the ticks &c. In Demerara they are called "Old Witches."

22. Coccyzus minor, *l. c.* p. 273. (*Coucou manioc.*)

Found everywhere, but sparingly and singly; always busy hunting among the trees and bushes, creeping, as it were, amongst the branches; is generally noisy just before and during rainy weather; is a somewhat stupid bird, and does not think of avoiding danger.

23. Tinnunculus sparverius, *l. c.* p. 273. (*Gret-gru Falaise.*)

This little Hawk is very useful as an insect- (cricket and grasshoppers &c.) destroyer; it is known sometimes to make a dash at a chicken, is a very bold bird, will soon become tame enough to feed; it then greedily eats small lizards &c. These birds possess considerable power of flight, going at times to a great height, and circling about for a long time. I have seen them hovering, perfectly motionless, for several minutes at a time in the teeth of a very stiff breeze, then suddenly swoop and carry off some small animal or grasshopper so rapidly that their motions could hardly be followed.

24. Butorides virescens, *l. c.* p. 273. (*Caylie.*)

Generally found wading in the shallow stony parts of our rivers; towards evening may often be seen in the pastures, especially in wet weather. When disturbed it flies for concealment to some tree overgrown with lianes, and soon hides itself, which it does very cleverly.

25. Nycticorax violaceus, *l. c.* p. 273. (*Crabier.*)

Much valued by the sportsman as a game-bird. Keeps hidden in the woods during the daytime, and towards evening comes down to the sea-coast and the open parts of the rivers, to seek its food, which seems to be principally crabs.

b. *Species new to the list.*

The second collection forwarded by Mr. Semper contains examples of the following six species, which were not included in the first. I append Mr. Semper's remarks upon each of them.

1. Antrostomus rutilus, Burm.

I cannot distinguish the single skin sent of this species from the corresponding sex of *A. rutilus* (*vide* P. Z. S. 1866, pp. 136, 586). Mr. Semper gives its vernacular name as the "*Cent coups de Couteau*," under which it is also figured in Lieut. Tyler's drawings. See P. Z. S. 1871, p. 266.

"A night bird, builds on the ground, or rather lays and hatches there; during the day they nestle in pairs on the ground in quiet out-of-the-way places; but at night, during March to June, they disperse; and their cry, '*Cent coups de Couteau*,' rapidly pronounced, is to be heard in all directions in those places which they affect. From June to March they are seldom heard in the open, and it is supposed they retire into the interior of the island. (By 'open' is meant the cultivated part of the island, generally near the sea.)"—J. E. S.

2. Ceryle alcyon (Linn.): Sharpe, Kingfishers, pl. 79.

"The 'Pie,' or 'Kingfisher,' is to be found in pairs from Decem-

ber to April on our sea-coast and by the mouths of rivers. They fish both in salt and fresh water, are very shy and wary birds."—J. E. S.

3. CHAMÆPELIA TROCHILA, Bp. Consp. ii. p. 77.

Prince Bonaparte has given this name to the Martinican form of *C. passerina*, with which we may suppose the St.-Lucian form will agree; but I am very doubtful about its real distinctness, although it is upheld by Messrs. Newton (Ibis, 1859, p. 253).

"The 'Ortolan,' or Ground-dove, is found everywhere, but prefers sparsely bushed tracts of ground, the roads and cultivated lands, especially when these have been recently burned off. They keep together in pairs, sometimes many pairs together, feeding during the morning and afternoon, and generally retiring during the heat of the day to cool shady places. Though small they are very delicate eating."—J. E. S.

4. PORPHYRIO MARTINICUS (Linn.): Scl. et Salv. P. Z. S. 1868, p. 459.

"The '*Poule d'Eau*,' Coot or Waterfowl, frequents grassy spots near fresh water, is a great plantain- and banana-eater, and consequently in bad odour with the labourers who grow these fruits. The young, with the help of their undeveloped wings, climb up the mother's legs, and nestle under the feathers there. They are active and vigorous as soon as hatched. Very noisy birds in wet weather; very shy and wary, and not very plentiful."—J. E. S.

5. TRINGOIDES MACULARIUS.

"The 'Tivi-Tivi' is found solitary or in pairs almost all the year round on the sea-beach or by the river-sides."—J. E. S.

6. PHAËTHON ÆTHEREUS, Linn.

"This Tropic-bird breeds on some of the small islets of St. Lucia. It is known also as 'The Boatswain' and 'The Wobbler.'"—J. E. S.

4. On the Sea-bear of New Zealand (*Arctocephalus cinereus*) and the North-Australian Sea-bear (*Gypsophoca tropicalis*). By Dr. J. E. GRAY, F.R.S. &c.

[Received April 23, 1872.]

The southern Sea-bear was observed in Cloudy Bay, in 1773, in Cook's second voyage, where an account of it is given.

Several beautiful drawings of the animal were made for Sir Joseph Banks, which are now with the rest of his drawings in the Botanical Department in the British Museum. Dr. J. R. Forster wrote a description of the animal, which was published by the Berlin Academy

in an octavo volume under the title of 'Forster's Descriptio Animalium' (p. 64).

Forster sent copies of the figures and notes of the animal to Buffon, which were engraved and the notes published in the sixth volume of the 'Supplement' of his 'Natural History' (p. 336, tab. xlvii.) under the name *Ours marin*, under which name Buffon combined the Arctic and Antarctic Sea-bears, or *Ours marin*.

Lesson, in his compilation on Seals, called the species *Otaria forsteri* (Diction. Class. d'Hist. Nat. vol. xiii. p. 421); and Fischer notices it in his 'Synopsis' as *Phoca forsteri* (p. 250), and, curiously enough, adds, "Annon potius generi *Enhydris* adnumeranda?"

Not being able to see any specimen or skull of this species so that I could identify it with my species in the British Museum, and Forster's description of the skull and teeth only showing that it was a species of *Arctocephalus*, I recorded it under the name *Arctocephalus forsteri* in the 'Annals and Magazine of Natural History,' for 1868 (i. p. 219), and in the 'Supplement to the Catalogue of Seals and Whales,' published in 1871.

Dr. Hector, after my repeated inquiry for the New-Zealand Sea-bear, was so fortunate as to kill several specimens of this animal, and has most kindly sent to the British Museum an adult skull of those which he had procured. He observes in a letter which I have just received:—"I have since received another skull from the Auckland Islands [the most southern island of the New-Zealand group], of a very young individual; the characters are all the same, except that the palate is not so much contracted posteriorly; but the form and position of the posterior aperture is maintained; in my paper as published in our 'Transactions' [of the New Zealand Institute] I have suggested that the head (skull) is *A. cinereus*." He has since sent me two plates, one giving three views of the adult skull, and three of what he calls the very young skull. One is an *Arctocephalus*, and the other a *Gypsophoca*.

I have compared the adult skull sent by Dr. Hector with the figure of the skull of the adult male in Quoy and Gaimard's 'Voyage de l'Astrolabe,' 1824, tab. 13. figs. 1 and 2; and I believe that they represent the same species, though there is a slight difference in the position of the grinders as compared with the skull, which has the front edge of the fourth grinder even with the back part of the large aperture in front of the zygomatic arch, whilst in the figure the front edge of the fifth grinder appears to be in this situation; but this may only be a want of accuracy on the part of the artist. I have little doubt that Quoy's animal from Port Western and the New-Zealand one are the same; but it is a matter of doubt if the animal figured by Quoy is the *Otaria cinerea* of Desmarest's 'Mammalia,' pp. 251, 348, from Péron and Lesueur's 'Voyage,' tab. ii. p. 75, who received it from Kangaroo Island; for I am not aware that Péron brought home any specimen. It is certainly not the same as *Arctocephalus* (*Gypsophoca*) *cinerea* in the British-Museum catalogue, described from Mr. Macgillivray's specimens.

The New-Zealand skull is very like the skull of the Southern Fur-

Seal (*Arctocephalus nigrescens*) from the Falkland Islands and the south-west coast of Patagonia. It differs in the position and form of the grinders, and in the form of the palate, and its contracted sides and truncated hinder part; it differs considerably from it in the outline and prominence of the temporal bullæ and the os petrosa. The upper surfaces are very much alike, and the orbits are very large and of the same size. The lower jaws are very similar; but the callosity of the Falkland-Island specimen is rather longer, and the crown of the teeth is longer and rather more slender—the crown of the New-Zealand specimen being as long as broad, that of the Falkland-Island specimen being one third longer than broad.

The upper cutting-teeth in the New-Zealand species appear to form a much narrower series; in the nearly adult specimen, with the bones of the skull not quite knit, from the Falkland Islands, the series of upper cutting-teeth is rather wider; in the skull from the Falkland Islands very like the adult skull from New Zealand, it is half as wide again. Quoy's figure of the cutting-teeth agrees with the skull sent by Dr. Hector.

Mr. Allen suggests that all the Sea-bears of the Southern Ocean are of one species; but he does not appear to have seen specimens of skulls of any of them. If he had, at any rate he would have allowed that there were two. I think that the skulls in the British Museum show that there are three, which may be thus divided:—

* *Hinder opening of palate narrow, half-ovate in front. Upper cutting-teeth moderate.*

1. *Arctocephalus antarcticus*, Gray, Suppl. Cat. Seals and Whales, p. 17.

** *Hinder opening of palate truncated in front.*

2. *Arctocephalus nigrescens*, Gray, *l. c.* p. 20. Upper cutting-teeth large, in a wide series.
3. *Arctocephalus cinereus*, Gray, *l. c.* p. 24. Upper cutting-teeth compressed, forming a narrower series.

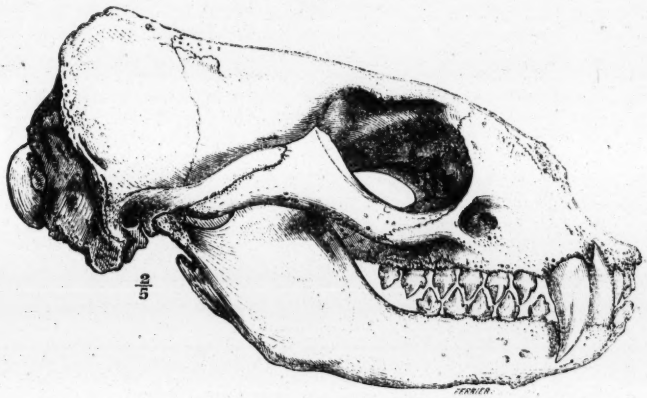
These skulls sometimes have the back of the palate more or less imperfect, and with a triangular notch or slit in the front edge.

It is curious, after Steller's and Forster's description of the Sea-bear, that they should be regarded as Seals; it is evident that Fischer observed their un-Seal-like characters when he inquired if they should not be arranged with *Enhydris*; yet Quoy and Gaimard figure the two species of this genus which they observed with elongate bodies and in the attitude of the common Seals (*Phocidæ*). And Gould did the same with the Australian species; I believe he had never seen the specimen alive.

ARCTOCEPHALUS CINEREUS.

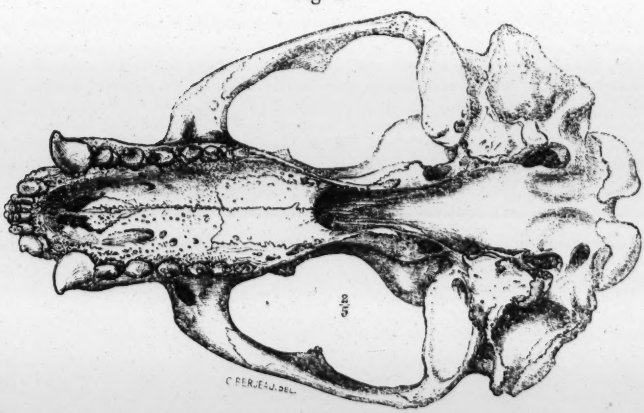
Sea-bear, Cook's Second Voyage.
Phoca ursina, John R. Forster, Descriptio Animalium, p. 64.

Fig. 1.



Arctocephalus nigrescens. Falkland Islands.

Fig. 2.



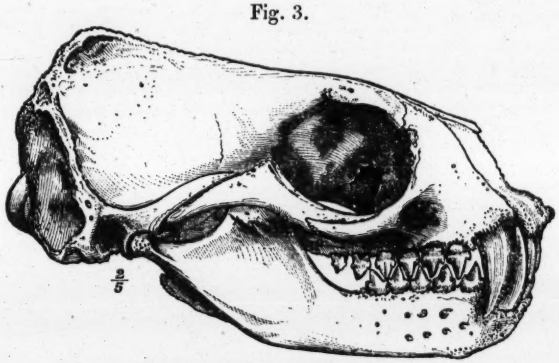
Arctocephalus nigrescens. Falkland Islands.

***Ours marin*, Buffon, Hist. Nat. Suppl. vi. p. 336, t. 47.**

***Otaria cinerea*, Péron, Voy. Terr. Austr. ii. pp. 54?, 77; Desmarest, Mamm. p. 251; Quoy et Gaim. Voy. de l'Astrolabe, Mamm. p. 89, t. 12, 13, & 15; Peters, Monatsb. May 17, 1866, p. 272.**

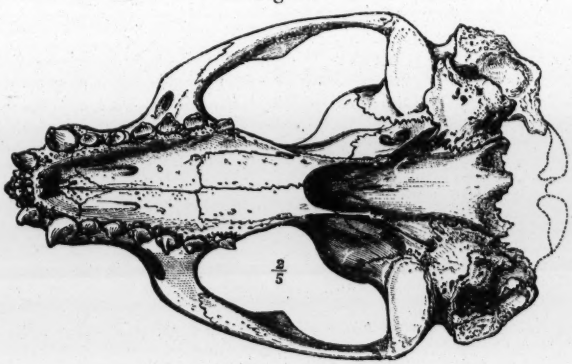
***Phoca cinerea*, Fischer, Synopsis, p. 233.**

Fig. 3.



Arctocephalus cinereus. New Zealand.

Fig. 4.



Arctocephalus cinereus. New Zealand.

Otarie (*Ours du M. Gaimard*), Cuvier, Oss. Foss. v. p. 222.
Otaria lamarii, J. Müller, Monatsb. p. 334.
Otaria ursina, Nilsson, Monogr. p. 332.
Otaria forsteri, Lesson, in Dict. Class. xiii. p. 421.
Phoca forsteri, Fischer, Synopsis, p. 333.
Arctocephalus forsteri, Gray, Suppl. Cat. Seals and Whales, p. 25.
Otaria (*Arctocephalus*) *cinereus*, Peters, Monatsb. 1866, pp. 272, 671.
Arctocephalus cinereus, Allen, Bull. Mus. Comp. Anat. ii. p. 45? (not Gray, Suppl.); Hector, New-Zeal. Institute, iv. t. xii. fig. 1, p. 196 (skull).

Hab. Port Western, N. H. (*Quoy*); Dusky Bay, New Zealand (*Forster*).

The skull which Dr. Hector sent from New Zealand is a true *Arctocephalus*, belonging to the section *Euotaria* of my Supplement to the Catalogue of Seals, and is quite distinct from the specimens of the skulls which the Museum received from Mr. John Macgillivray as coming from North Australia, which form my subgenus *Gypsophoca*—indeed, so distinct, that I must consider *Gypsophoca* a distinct genus, more allied to *Phocarctos* than to *Arctocephalus*.

The study of the skull would reduce the tribe *Arctocephalina*, as characterized in the 'Supplement to the Catalogue of Seals and Whales' (1871, p. 11), into two divisions, thus:—

* *Grinders, two (fifth and sixth) hinder upper quite behind the hinder edge of the zygomatic arch.*

1. Phocarctos. Skull elongate, front part much longer than twice the length of the hinder part of the skull to the condyle. Palate very deep, much wider in the middle. Under-fur sparse.
2. Gypsophoca. Skull broad behind, tapering in front; the front part one third longer from the condyle than from the condyle to the occiput. Palate narrow. Under-fur abundant.

** *Grinders, the hinder one (or sixth) quite behind the hinder edge of the zygomatic arch.*

3. Arctocephalus. Under-fur abundant.

The first, second, third, and fourth upper grinders have an undivided root, whereas the fifth in the upper jaw has the root more or less divided, which in the fifth and sixth is well divided; but the distinctness of the division of the roots of the grinders appears to depend on the growth of the animal. The position of the grinders in the small skulls may be observed before the bones are united together at the sutures. The milk-teeth of the Seals and the Sea-bears are changed very soon after birth, and these animals have a complete series of the permanent teeth when only a few weeks old. The teeth become larger as the jaw grows in size, but they retain their original position with regard to the parts of the bones of the face and the zygomatic arch.

Their position affords an excellent character for the distinction of the species and division of them into groups. Allen, in his plates of the northern Sea-bear (*Callorhinus ursinus*), figures the skull and teeth of two adult animals and the skull of one only thirty-five days old—the latter showing the teeth exactly placed as in the figures of the two adult specimens. These skulls also exhibit the varieties that exist in the form of the hinder opening to the nostrils of the same species, the chief difference arising in the more or less imperfect manner in which the hinder margin of the palate is developed.

1. The Sea-lions (*Otaria*) have the palate produced to a line even

with the condyle. They have only six grinders in the upper jaw, and the last is placed even with the hinder edge of the zygoma.

2. The Sea-bears have the front angle of the hinder nasal opening in the middle of the zygomatic arch.

* *Callorhinus*, *Phocarctos*, and *Gypsophoca* have six grinders in the upper jaw; and the two hinder grinders are on a level with, or behind, the hinder edge of the zygomatic arch.

** *Arctocephalus* has six grinders in the upper jaw, and only the hinder one is behind the hinder edge of the front part of the zygomatic arch.

*** *Eumetopias* has five grinders in the upper jaw; the fifth is far away from the rest and behind the hinder edge of the front part of the zygomatic arch, with a pit between the fourth and fifth as if a tooth were absent; but it is so in all the specimens I have seen, and Mr. Allen figures it with this peculiarity.

**** *Zalophina* and *Neophoca* have only five grinders in the upper jaw, the fifth grinder being opposite the middle of the front end of the broad zygomatic arch.

Gypsophoca.

Skull broad behind, at the part behind the ear-hole; the palate narrow, concave; the internal nostrils rounded in front, and diverging on the sides behind. Grinders $\frac{6}{5} \cdot \frac{6}{5}$, the two hinder upper with two roots, quite behind the hinder edge of the zygomatic arch; the fifth lower fitting between the fourth and fifth upper grinders; the crown of the grinders triangular, elongate, recurved; the upper with a slight denticle in front of the base, the two hinder smooth; the lower ones with a notch on each side.

Arctocephalus, *** *Gypsophoca*, Gray, Suppl. Cat. Seals and Whales, p. 24.

This genus is most like *Arctophoca* in the position of the teeth; but the palate is much narrower, the face short, and the hinder part of the skull much larger and more ventricose. It differs from *Arctocephalus* in the position of the upper grinders, the narrowness of the palate, &c.

Gypsophoca tropicalis.

Black, grey beneath; under-fur abundant, reddish brown.

Arctocephalus nigrescens, b & c, Gerrard, Cat. Bones B.M. p. 147.

Arctocephalus cinereus, Gray, Cat. Seals and Whales, p. 56; Ann. & Mag. Nat. Hist. 1866, xviii. p. 236 (not synonyma); Hector, Trans. New Zealand Instit. iv. t. xii. f. 2, p. 196.

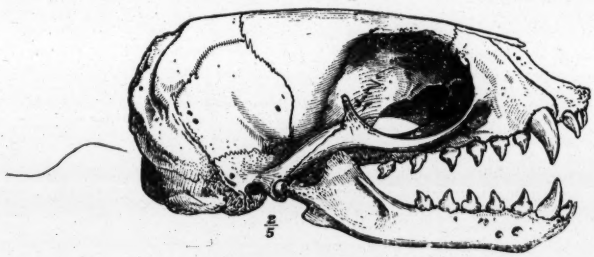
Otaria stelleri, Schlegel, Fauna Japonica, tab. xxii. figs. 5 & 6 (skull)?

Hab. North coast of Australia (*Mr. John Macgillivray*).

There are adult and young specimens of this species, a perfect skull of a young individual, and the nose, palate, and upper jaw of this species in the British Museum.

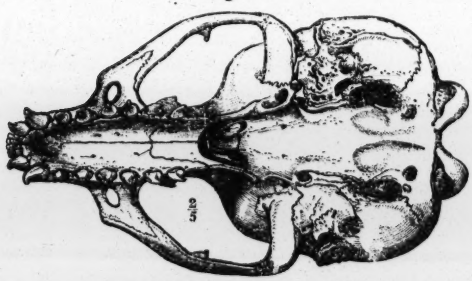
The small skull figured by Temminck seems more to resemble this species than *Arctocephalus cinereus*.

Fig. 5.



Gypsophoca tropicalis. Auckland Island.

Fig. 6.



Gypsophoca tropicalis. Auckland Island.

Dr. Peters, in the 'Monatsbericht,' 1866, p. 276, t. 2, describes and figures a skull from Juan Fernandez, on the west coast of America, which he received from Dr. Philippi, and founded on it his genus *Arctophoca*, calling it *A. philippii*.

This skull of *A. philippii*, from the large size and peculiar form of the brain-cavity, and the peculiarities of its underside (especially its large foramen), agrees with the skull from North Australia in the British Museum which I have called *Gypsophoca tropicalis*; but it is described and figured as only having five grinders on each side of the upper jaw, and Dr. Peters founds his characters on this peculiarity. I believe that the skull will be found to have lost the small upper hinder grinders, for which there is space at the hinder end of the

alveolar edge. The skull has the fifth grinder behind the back edge of the front part of the zygomatic arch. The only Seals that I know that have the teeth in this position have six grinders in the upper jaw; and they, like this genus, all have triangular-shaped grinders and abundant under-fur.

Dr. Peters in his second paper on Eared Seals, 'Monatsbericht,' 1866, p. 671, enlarges his subgenus *Arctophoca*, and also refers to it *Otaria falklandica* of Shaw and Burmeister, which he says is my *Otaria nigrescens*, from the unpublished figure of the skull of it which I gave him, and which is a species of my restricted genus *Arctocephalus*, which has only the sixth upper tooth behind the front of the zygomatic arch.

Dr. Philippi sent a description and figure of a skull that he had received from the island of Masafuera, on the west coast of South America, which is published by Dr. Peters in the 'Monatsbericht' for 1871, p. 588, t. 1, 2, and which he calls *Arctophoca argentata*. This skull wants the hinder part of the brain-case, has six grinders in its upper jaw, and is in every respect very like the skull of *Gypsophoca tropicalis* and the *Arctophoca philippii* from Juan Fernandez. It chiefly differs from the figure of the latter skull, as Dr. Philippi shows in his plate, in the hinder portion of it being narrower, and the condyles much shorter or rather narrower.

These three skulls appear to me to belong to one group; but whether they are three distinct species (two from the west coast of South America, and one from North Australia) I will not attempt to determine, as I have only seen the skins and skull of the one from the latter region; but they are all Fur-Seals and may be distinct.

Dr. Philippi proposes to enlarge the genus *Arctophoca*, and refers to it four species, which he thus characterizes:—

"1. *Arctophoca falklandica*, Shaw, Gray, Burmeister. Grau, mit blas rother Unterwolle. Atlantischer Ocean.

"2. *A. nigrescens*, Gray. Schwärzlich, mit dunkel rostrother Unterwolle. Atlantischer Ocean.

"3. *A. argentata*, Philippi. Grau, mit blas rother Unterwolle. Stiller Ocean.

"4. *A. philippii*, Peters. Schwärzlich, mit dunkel rostrother Unterwolle. Stiller Ocean."

If *A. falklandica* is my *Arctocephalus falklandica*, I have never seen its skull and do not know the position of its teeth.

A. nigrescens has the sixth upper grinder behind the back edge of the zygomatic arch, and belongs to my restricted genus *Arctocephalus*, in common with *A. antarctica* of the Cape, which is F. Cuvier's type of the genus, and *A. cinereus* of Quoy and Gaimard, of New Holland and New Zealand. *A. argentata* and *A. philippii* have the fifth and sixth upper grinders behind the back edge of the zygomatic arch, and, I believe, are both referable to the genus *Gypsophoca*.

The figures of the skulls of *Otaria philippii* and of *Otaria argentata* have the front edge of the hinder aperture of the nostrils with a triangular slit in the middle; the young skull of *Gypsophoca tropicalis* has it truncated and entire; but this part, as I have

already observed, is liable to be imperfect in this respect in many species.

Temminck, in the 'Fauna Japonica,' makes some observations on the Eared Seals, and shows the inaccuracies of his predecessors. He describes one species, *Otaria stelleri*, and observes that the plate of the entire animal was drawn from a living animal in Japan.

It is very unlike the living animal of the family figured by Forster and that now alive in the Zoological Society's Gardens. The fins look much more as if they were from a stuffed specimen made by a man who never saw a living Sea-bear. He figures the skeleton and three skulls as different ages of the same species, calling one (t. 22. f. 1, 2) from a very old, the second (t. 22. f. 3, 4) from an adult, and the third (t. 22. f. 5, 6) from a middle-aged specimen—I suppose, all from Japan; but I do not see it so stated. The first two have only five upper grinders and very differently shaped heads; the third has six upper grinders and is a *Gypsophoca*. No species has been described from the North Pacific; and it may be a new species yet undiscovered, as all the other species come from the other side of the equator.

I should, judging from the figures, regard them as belonging to two, if not three, distinct species, and the whole theory of their being different ages of the same species as a mistake arising from not studying the growth of the teeth in these animals.

The skeleton of *O. stelleri* (t. 23) is taken from the same specimen as the skull which he says is of a very aged individual (t. 21. f. 1, 2), and is most probably the adult of *Zalophus gillespii*. Skull, figs. 3 and 4, may be the young of the same species; but, unfortunately, the underside is not figured of any of these skulls, so as to show the position of the teeth in connexion with the zygoma; and figures 5 and 6 are evidently *Gypsophoca*, as above stated.

5. Note on *Hyla punctata* and *Hyla rhodoporus*. By Dr. A. Günther.

[Received April 24, 1872.]

Hyla punctata was named by Schneider in the year 1799 (Hist. Amph. i. p. 170) and described thus:—

> "*Colorem griseum albidum distinguunt puncta nivea, sine ordine sparsa, inter oculos et per totum dorsum; tænia etiam nivea dorsum utrinque cingit, ab oculis ducta supra aures usque ad femora.*"

This characteristic white band, similar to the lateral glandular fold of a *Hylorana*, is also mentioned by all following authors who had really examined examples of this Tree-frog: it is distinctly described and figured by Spix (1825, Spec. Nov. p. 37, tab. 9. fig. 4, *Hyla*





1/8

Imp. Lith. M & N Hanhart imp.

ATELES FUSCICEPS

variolosa), by Gravenhorst (1829, Delic. p. 30, tab. 6. fig. 2), by Duméril (1841, Erpét. Génér. viii. p. 553), by Burmeister (1856, Erlaeuterungen &c. p. 104), and was finally observed by myself in two well-preserved examples, one from Bahia (Dr. Wucherer, 1864) and the other, possibly, from Surinam (Museum Van Lidth de Jeude, 1866), which I accordingly named *Hyla punctata* of Schneider, and placed in the British-Museum collection with this name. Moreover these specimens were distinguished by a comparatively small tympanum of the size indicated by Duméril.

The typical example of *Hyla rhodoporus* (Proc. Zool. Soc. 1868, p. 488, pl. 37. fig. 4) from the Upper Amazons differed by lacking the white lateral band, and by having the tympanum larger; and even now, after six years' immersion in spirit, no white spots on the back have become visible. From a comparison of this specimen with the one from Bahia, one could scarcely believe in their specific identity.

Nevertheless I am now inclined to regard them as being of the same species. Having had my attention drawn to this point by Prof. Peters's note in Monatsber. Ak. Berlin, 1871, p. 403, I have reexamined our examples, the number of which has been increased to six; and although there is not one among them which agrees with *H. rhodoporus* in coloration, some approach it as regards general form and size of the tympanum; and I agree with Prof. Peters that, with our present materials, the specific distinctness of the two forms cannot be maintained.

Finally I may remark that *Hyla papillaris*, Spix, Spec. Nov. p. 34, tab. 8. fig. 2, may represent also a *Hyla punctata* without lateral bands.

6. On the Species of Quadrumana collected by Mr. Buckley in Ecuador. By P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received May 1, 1872.]

(Plate LIV.)

When Mr. L. Fraser returned from Ecuador in 1860 he informed me of the existence of a large Monkey in the valleys of Western Ecuador, of which he had not been able to obtain specimens. I heard of this fact with much interest, as, although I had paid much attention to the distribution of the American Quadrumana, I was not aware of any species having been then recorded from any part of Western Ecuador, and I felt sure that the Monkey observed by Mr. Fraser, when obtained, would turn out to be a new or little-known species.

Mr. Edward Gerrard, Jun., having kindly allowed me to examine

the skins of the Monkeys obtained by Mr. Buckley during his recent expedition to Ecuador, I have been able to ascertain what the species of Monkey observed, but not obtained, by Mr. Fraser was. Though not undescribed, it turns out to be a rare species, the *Ateles fusciceps* of Dr. Gray.

The species was so named in manuscript by Mr Fraser in 1845, when engaged in preparing a catalogue of this Society's former collection. The typical specimen having passed into the British Museum, was first described by Dr. Gray, in the 'Proceedings' of this Society for 1865, p. 733.

Ateles fusciceps was the only species of Monkey obtained by Mr. Buckley in Transandean Ecuador, although a second species, probably a *Mycetes*, was observed. From the neighbourhood of Macas, on this side of the Andes, Mr. Buckley has brought skins of five other species—namely, *Mycetes seniculus*, *Lagothrix infumuta*, *Pithecia monachus*, *Nyctipithecus lemurinus*, and *Saimaris sciurea*.

All these, however, are already known as inhabitants of Upper Amazonia, and no doubt ascend the upper branches of the main stream so far as they meet with a congenial country.

Ateles fusciceps, of which I now exhibit the flat skin obtained by Mr. Buckley, and a drawing prepared from it (Plate LIV.), is a very well-marked species of this genus, readily known by its thick black fur and deep coffee-brown crown.

The hairs of the back have brownish tips. The skin measures 20 inches from the nose to the base of the tail, the tail 26 inches.

There appear to be no traces of a thumb on the fore limbs.

7. On the Skeleton of *Todus*, with Remarks as to its Allies. By Dr. James Murie, F.L.S. &c. (Communicated by Professor Alfred Newton, F.R.S., V.P.)

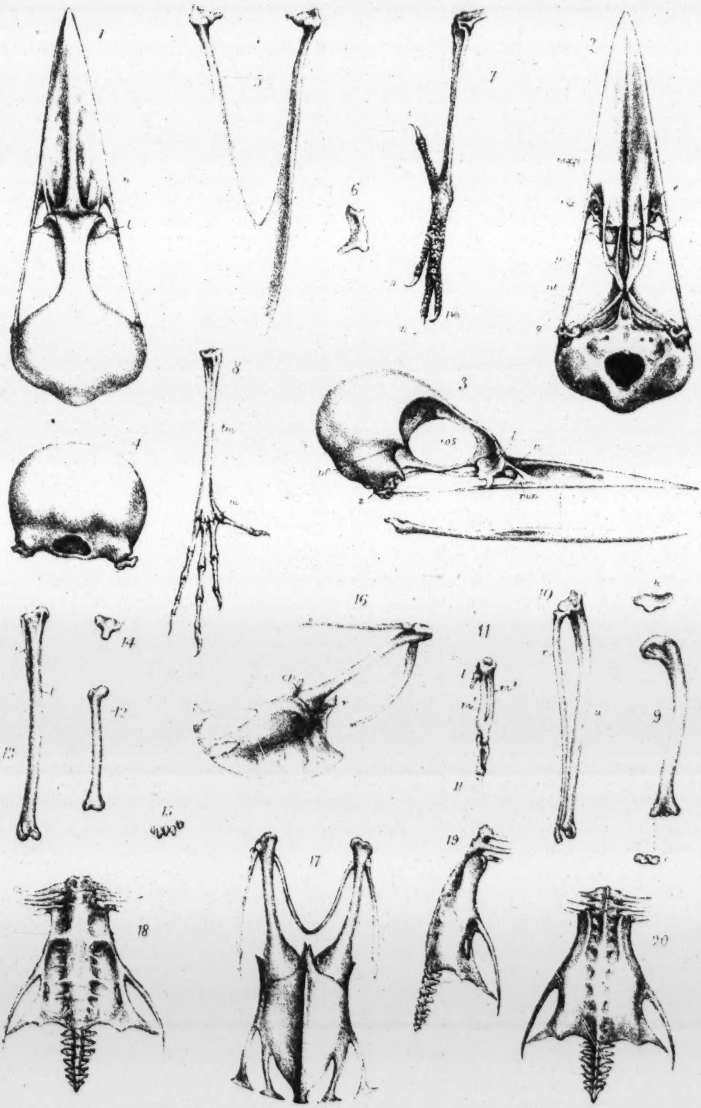
[Received May 3, 1872.]

(Plate LV.)

When working at my memoir "On the Anatomy of the Kingfishers" I regretted much not having any specimen of Tody at my command, nor even a skeleton to compare with that of *Ispidina*, to which *Todus* in its external aspects bears resemblance. Thus placed, I had to confine my osteological remarks to the assertions of others concerning *Todus*, instead of basing them on my own observations and comparisons side by side, which I should have preferred.

Lately, Professor Alfred Newton has most kindly put at my disposal a skeleton, which I eagerly avail myself of, to make good in part my deficiency respecting this interesting genus.

Unfortunately the species and sex of the bird are not known; but, as the donor observes to me in his note, "the osteology of any one



OSTEOLOGY OF TODUS

BIBLIOTECA
280673
CENTRALE

will stand for all," implying thereby the main features of the type.

I had proceeded in describing this skeleton, and elicited its probable relations, but upon one point doubted if my interpretation was correct. On consulting my friend Mr. Parker, to fortify or modify my opinion thereon, I fell in luck's way; for, besides discussing the moot question, he put in my hands a good skeleton of the Green Tody, *T. viridis*, authenticated by Mr. Osbert Salvin, the original possessor. This increased material happily enables me to substantiate characters doubtless generic.

My text, in its detail, and the illustrations apply specially to Prof. Newton's specimen; but they agree so closely with the undoubted *T. viridis*, that I have not required to alter or amend statements appertaining to the former.

Under the subfamily *Todinæ*, Mr. Eyton* enumerates a few of the salient osteological distinctions of the Green Tody (*T. viridis*), which I here quote in full:—"Cranium similar in shape to *Merops*; the maxillaries much flattened, covering the roof of the mouth for nearly one half the length of the cranium; impression for the masseter muscles very slight; a deep impression at the base of the nasal bones, from which a ridge proceeds over the top of the bill. Palatine bones similar in shape to *Merops*. Interarticular bones long, bent backwards in the middle. Sternum, pelvis, and other bones also similar."

His illustrations comprise a profile of the skeleton† and under view of the sternum‡, both of the natural size; and, besides, a somewhat enlarged sketch of portion of the palatal region§. The small size of the figures mar considerably their usefulness for purposes of comparison. His analysis of osseous configuration, good in its way as a limited diagnosis of the genus, is, notwithstanding, imperfect when one attempts to gather the threads of structural relationship which the skeleton bears to divers others of the feathered tribe. These words are not to be interpreted as a wish to cavil with the labours of the said author. Rather, to Mr. Eyton's credit, be it said that he has been one of the few English ornithologists who have thoroughly appreciated the dominant stamp of characters impressed on avine skeletons, as is the case in other groups of the Vertebrata. His valuable volume, indeed, may be likened to a strong outpost commanding the flank of the enemy, and which I have the advantage of using as a basis of further operations, in sending a raking fire towards the centre.

Cuvier does not seem to have examined the anatomy of the genus *Todus*, his inference as to its position being deduced from the figure of the bill and structure of the feet. Within recent times another French comparative anatomist of some eminence, M. Émile Blanchard‖, has described and figured the sternum of *T. viridis*. His opinions regarding it I shall again have occasion to refer to.

* 'Osteologia Avium,' 1867, p. 57.
† Pl. 5 B. fig. 1.
‡ Pl. 8. fig. 9.
§ Pl. 12. fig. 8.
‖ 'Ann. des Sci. Naturelles,' 4e ser., tom. xi., xii. (1859), p. 120, pl. 5. figs. 13–15.

This is all I find which has been done towards elucidation of the osseous organization of *Todus*, and justifies my portraiture of the separate bones. These I have most carefully sketched twice their natural size, to bring into relief those discriminating lineaments subdued and lost sight of in a diminutive skeleton.

Of the Cranium and Mandible.

The skull, on the side view, I should as lief compare to that of the Rose-cheeked Kingfisher (*Ispidina picta*), the Motmots (*Momotus*), or even the Spotted Flycatcher (*Muscicapa grisola*), as merely to that of the Bee-eaters (*Merops*). In fact, it is not too much to say that, *pari passu*, it has no mean resemblance to some of the Woodpeckers', *Picus viridis* for example; but critical investigation shakes such hasty conception.

In profile, the hinder segment, or that containing the brain, is full, roundish, and high. The supraoccipital area, particularly, is unduly prominent; and beneath this the outline shelves sharply downwards and forwards. The vacuity of the orbit equals the long diameter of the cerebral region; and the beak (or præmaxillæ) has a length nearly corresponding with the two parts behind. In other words, the osseous beak occupies half the length of the skull, or, indeed, slightly over that. This coincides with Eyton's observation, but does not agree with the proportions extant in the Bee-eaters, Jacamars, and Hoopoes, where the præmaxilla is often twice the length of the remainder of the cranium.

Amongst most of the Kingfishers, the beak is greatly in excess of half the long axis of the skull, *Ispidina picta* in its proportions (likewise *Momotus lessoni*) coming nighest to what obtains in *Todus*. The basal plane of the skull, in the view now under consideration, is almost on a horizontal line, there being only a very slight indication of depression towards the tip of the præmaxillæ. The latter throughout are very shallow and low compared with the orbito-central regions. The nasal orifice attracts attention by its elongate magnitude. From the root of the beak the prefrontal region rises very abruptly, and continues by a steep inclination to the vertex, the highest part of the skull being almost vertical with the posterior margin of the orbit. The latter is large and somewhat triangularly outlined, the narrow truncate end being forwards.

The posterior or occipital aspect of the skull of the Tody is characterized by smooth plumpness, tendency to quadrature of figure, the corners being bluntly rounded, and by the node-like elevation of the supraoccipital. In these respects it assimilates to *Ispidina* among the Alcedinidæ—yet, withal, is trenchantly separate therefrom by several particulars, which I shall notice in speaking of the separate cranial bones.

The general rotundity of the occiput and very feeble squamous groove more stringently belong to *Muscicapa*, though *Merops*, *Momotus*, *Eumomota*, *Galbula*, *and Picus* all manifest the same ten-

dency, the temporal muscular groove, however, being much better marked in them.

The cranial contour of *Todus* examined from above answers better to *Ispidina* than to *Halcyon*, *Dacelo*, and the narrow-beaked genera of Kingfishers. The two former, however, are quite as distinct from each other as are the varied types of the Kingfishers among themselves. The chief feature which draws *Todus*, *Ispidina*, and *Eumomota* together is the moderate breadth of the præmaxillæ, these bones continuing of fair width forwards. But in *Ispidina* they terminate more acutely than in *Todus* and *Eumomota*; and in the former they possess an outer basal constriction absent in the two latter. The said constriction is not met with in the Laughing Kingfisher (*Dacelo*); but, again, its broad beak has a pyramidal shape entirely different from the very low convex form in the Tody and *Eumomota*. In *Todus*, as contrasted with *Ispidina* and *Eumomota*, the prefrontal region is proportionally narrower and longer; the lower corners of the lachrymals are placed at right angles to the long axis of the skull, and the cerebral division is wide compared with its fore-and-aft length. In *Merops*, *Upupa*, and *Galbula*, and in a less degree in *Momotus*, the broad-based and sharp forward cut of the beak, the short, very wide prefrontal or interorbital breadth, with the production anteriorly of the postorbital margin, are the reverse of what obtains in *Todus*. Whilst the prefrontals are narrow in *Muscicapa*, as in *Todus*, yet, on the other hand, in the former the beak is short and triangular, and the cerebral region antero-posteriorly fuller than in the latter. *Picus*, according to the size of the species (in the case of the smaller most markedly), manifests an upper skull-contour of a very different pattern.

The inferior view or base of the skull of the Tody necessarily has an outline corresponding to its vertex; but the facies of the præmaxillæ, palatines, pterygoids, sphenoid, &c. involves material differences of the mid area. The spaces enclosed by the jugal rods are long and narrow; the posterior narial orifice trends well back, causing the pterygoids to meet at a wide angle; the foramen magnum comes into full view; and the spheno-occipital region is, on the whole, inflated. The differences extant in allied forms I shall allude to hereafter.

With regard to the dimensions of the skull, seeing I have given enlarged figures, I may in this place take note of a few of the measurements, of natural size:—Extreme length 1·3 inch; extreme breadth (that is, above the tympanic region) 0·45 inch; and greatest height the same, the skull resting on a flat surface; beak from anteorbital root to its tip 0·7 inch; width of the præmaxillæ at their junction with the jugals 0·3 inch, and at their middle about 0·2 inch.

In reviewing the component parts of the cranium I shall commence with that portion which of recent date has attracted most attention, I mean the palatal region.

In the dried skull of the Tody each palatal moiety presents posteriorly a somewhat triangular, or V-shaped, horizontal plate, the rearmost angle meeting the pterygoid. The anterior angles of the

plate send forwards an external and an internal spicule. The former narrow bony bar passes over the under surface of the lachrymal, maxillary, and maxillo-palatine enlargement, and, widening in its course, reaches and becomes anchylosed with the præmaxilla. The latter internal spicule passes onwards parallel with the outer one, and proceeds to the mesial edge of the maxillo-palatine bone. It is truly osseous to opposite the lachrymal, and is continued by ligamentous or tendinous material, which bears close resemblance to bone in its dried condition. Thus a long oval gap is left between the antero-external and internal palatal processes. The maxillo-palatines are spongy, and of fair size. They approach close to one another, but do not meet in the middle line—a narrow fissure separating them, floored by the osseous nasal septum. The mesial groove shallows forwards, but is continued quite to the apex of the beak.

Fortunately for me, the base of the skull which I received from Prof. Newton had the dried membranous structures in part remaining; and on moistening and clearing off these, I gained insight respecting the fresh condition of the soft tissues &c. occupying the inferior palatal region. A membrane filled up the oval gap betwixt the anterior palatal processes; and a thin pellicle of the same partially extended over the inferior hollow of each maxiliary, and connected the outer edge of the external palatal process with the exterior border of the præmaxilla.

On slightly depressing and elevating the beak, or simulating its probable natural movements in life, I observed that in the latter action the lips of the posterior nares approximated and all but closed the fissure, the side parts, meanwhile, being kept tense. The beak's depression produced the reverse, membranes and elastic osseous rods equally springing outwards so as to open elliptically the post-narial fissure.

During the latter action two rod-like tendons come into view, simulating the bifid vomer of the Woodpeckers; and there is also a deeper median muscular bundle, besides large palatine nerves, which fill the fissure betwixt the maxillo-palatines and thence run forwards. These tendino-muscular slips arise from the incurved margin of the palate-bones, or what may correspond to the vomeric crest of human anatomy, and are inserted into the maxillo-palatines. They evidently are the homologues of the levator and circumflex or tensor palati muscles. The above arrangement is interesting; for it explains to me an incongruity in Prof. Huxley's account of the palate of the Picidæ. The pair of anterior ossicles described by him correspond to the tendinous rods in *Todus*, external to which in both forms are oval spaces, otherwise bony plates in most of the Coccygomorphæ.

Todus, in the contraction and rod-like character of the anterior portion of its horizontal palatal plates, and in the large oval spaces, differs from the Alcedinidæ, the Momotidæ, the Meropidæ, the Galbulidæ, and the Upupidæ, and contrariwise, in the said respects, assimilates to the structure found in the Muscicapidæ and some others of the Coracomorphæ. Among the above I believe the genus *Eumo-*

mota exhibits a gradal disposition of the parts, which character is heightened by the oblique truncation and posterior spineless nature of the palatal plates, and the short pterygoid bars. But in this genus and in *Momotus* the maxillo-palatines are mesially adnate, whereas in the other Coccygomorphine groups compared the osseous nasal septum less or more separates them.

If we turn to the præmaxillæ, or what constitutes the beak, and for obvious reasons examine its upper surface, we shall at once be able to differentiate it from the whole of the Alcedinidæ, and notice some points allying it to the Momotidæ and Meropidæ. In the former groups, without exception, the opposite bones rise high, and incline towards each other with a well-defined ridge, sharp or rounder as may be, and occasionally, as in *Pelargopsis*, with a decided culmen. In *Todus* there is a most marked flatness, the bones exhibiting but a very slight convexity in front of the nares, and that which divides these orifices is limited to a low narrow rod or spicular bar. The nostrils are each 0·3 inch long, straight, elliptical, and widely patulous; they are most like those of *Dacelo* as far as magnitude is concerned, but, even relative to it, by far greater, and descend within a trifle of the inferior premaxillary border. The oral surface of the præmaxillæ is uniformly flat, and the vascular sculpturing or furrows most delicate.

The descending branch of the nasal bone forms a small, obliquely set ridge, surmounting the superior maxillary bone, and barely distinguishable from it. The inner branch and the fillet anteriorly bounding the fronto-maxillary hinge are both very narrow. *Todus* is unlike the Alcedinidæ and Momotidæ, great and small, in the low narrow ledging of the latter parts, and particularly in the way in which the prefrontals impinge in a rounded abrupt manner. It is this which gives the deep impression at the base of the nasal bones alluded to by Mr. Eyton.

In the size and shape of the narial orifices, lowness of depth, and rounding of the upper surface of the præmaxillæ, *Eumomota*, *Merops*, and some species of *Picus* have a cast towards *Todus*; but the arch of their nasal bones, relatively, is by far stouter; their præmaxillæ, again, are more bent at the tip than in it.

The flatness, or wide shallow concavity of the prefrontals, which obtains in most of the Kingfishers and Motmots, does not apply to *Todus*; where each moiety is convex, the sagittal suture alone being represented by a well-marked mesial furrow. The prefrontals altogether are narrow, thus giving little interorbital breadth, which is even more strongly pronounced by the smallness of the upright limb of each lachrymal, which abuts against the anterior outer margin. Moreover this disposition produces a shallower appearance in the supraorbital incision, which in reality is deeper and wider than in the Alcedinidæ. As I have intimated, the ascending frontals have a steeper gradient than in the latter group, and the postfrontal region is in consequence more elevated even than in *Ispidina*.

Differentiation of the prefrontals &c. in some other groups I have alluded to in speaking of the skull's contour superiorly.

The temporal groove is very feebly impressed, as Eyton observes; and hence this and postfrontal prominence amplifies the cerebral breadth. The bulging, hemispherical supraoccipital and equally full squamo-mastoidal region, therefore, give both posterior and lateral magnitude of a kind different from that in the Alcedinidæ. In these last the squamal groove, lambdoidal definition and ridging, and the less widely separate exoccipital impressions exhibit a character which is deficient in the more rotund occiput of the Tody.

The basiocciput and so-called basitemporal in *Todus* are relatively short antero-posteriorly; but, on the contrary, the bones spread well out towards the tympanic fossa, giving breadth to the basal region. Each quadrate bone is short-limbed, and, as in *Halcyon* and *Ispidina*, descends little below the basal plane of the cranium; but it differs from them in so far that it does not laterally project beyond the parieto-temporal facies.

There are no basipterygoid processes. The pterygoid bars are short, and meet each other at a considerably wider angle than in most of the Kingfisher tribe—a condition, as I have already pointed out, approximating to what obtains among the Motmots.

Regarding the ocular cavity (the truncate-wedge contour which has already been spoken of), it possesses an uncommonly large interorbital space. An osseous interorbital septum, in fact, is all but absent. It may be a question whether the septal deficiency, and the membranous rather than osseous character of the alisphenoids, &c., do not denote juvescence in our bird. Still, in other respects, the skeleton appears that of an adult; and I am the more convinced that this membranous condition is the natural one, as in Mr. Parker's undoubtedly full-grown specimen it is quite as notable as obtains in Prof. Newton's.

The postfrontal and zygomatic processes are short.

The lachrymal bone, of an L-shape, has an upper widish truncate limb, only a small portion of which is visible from the front, the greater part of the bone resting wedged in between the prefrontal and preethmoid peninsulæ. The lower limb is spongy at its root, and sends out a narrow process, which lies upon the jugal, and acts as a kind of fulcrum to it in the resilient movements of the beak.

The mandible is precisely 1 inch long, 0·4 inch in transverse diameter to the outer edges of the articular facets; and the breadth of the bone, measured at the posterior end of the symphysis, from one external border to the other, is 0·15 inch. Great flatness throughout characterizes the mandible, the symphysial segment, as seen on side view, being almost of the same depth as the rami. In this respect it agrees most with *Ispidina* amongst such of the Kingfishers as have come under my notice. The rami are thus bar-like, each laterally very compressed, tolerably straight and slender. Of the articular ends of the bone, I need but mention that the internal angular process is relatively of goodly size, almost Passerine in length, shallow, and narrow-pointed, the postarticular eminence unusually well pronounced, though low and upturned.

The symphysis is 0·32 long, widely scooped superiorly, this con-

cavity and the inferior convexity being slight. The tapering of the mandible is steady and constant from behind forwards, but with fair breadth at the symphysial end, and terminating rather bluntly.

I would call attention also to the fact (which I do not find noted by ornithologists), that the horny mandibular margins are minutely denticulate, or serrate, thus agreeing with what obtains in the *Momotidæ*.

Spine, Ribs, Breast-bone, and Pelvis.

With respect to the number of vertebral elements present in the spinal column, I cannot tabulate these with the precision which might be desired—partly on account of their diminutive fragile nature, and still more because of the usual indefiniteness between what strictly belongs to the dorsal, lumbar, and sacral regions. According to my reading of the case there are 12 cervical, 7 dorsal, 9 coalesced lumbo-sacral (and coccygeal), and 7 free caudal—in all, 35.

I am uncertain whether the last cervical does not possess a riblet, whereby it ought to be regarded as belonging to the series of the back rather than those of the neck.

Each cervical answers well to what has been portrayed by me in the Laughing Kingfisher, *Dacelo gigas*, dimensions excepted, the inferior styliform process possibly being relatively longer.

The dorsals have long spinous processes. I reckon those dorsal vertebræ which have ribs, and whose bodies are not ankylosed. But there is besides a vertebra firmly adherent to the sacral series, wherefrom the last rib seems to spring—though, from the costal adherence to the ilium, there is a certain dubiousness attendant.

The ankylosis of the lumbo-sacrals is complete. There is no development of inferior spines; and the continuous superior spine is very low, and outspread at its middle. These vertebræ, following Professor Huxley's nomenclature*, include lumbar, sacral, and uro-sacral, or (his more recent definition†) dorso-lumbar and sacral; nevertheless I prefer using the terms applied by me among the Alcedinidæ.

Of ribs, 8 exist on either side—the hindermost one, as I have intimated, partly resting against the anterior end of the ilium.

The total number of vertebræ in *Todus* (35) is less than in any of the Kingfishers, where they range from 37 in *Ispidina* to 41 in *Dacelo*.

M. Blanchard's determination of the sternum, his three outlines of that of *T. viridis*, and the illustrations of Eyton lighten my task. As the former author remarks, one is struck by its resemblance to those of the Kingfishers. The summary of its distinctive points are:—shortness with breadth, and the sternal plates convex; tenuous external and internal xiphoid pedate processes, with four deep fissures; keel deepish, but moderately produced in front, its anterior margin very shallow-bayed, and a high upward-pointed rostrum, barely cleft at the point; deep coracoid gutters, and internal mesial

* "On the Classification of Birds," P. Z. S. 1867, pp. 419, 422.

† 'Manual of the Anatomy of Vertebrated Animals,' p. 278.

foramen; costal process large and elongate. As to the connecting girdle of bones, each coracoid exceeds the oblique sternal diameter (*i. e.* from coracoid groove to the middle xiphoid process); epicoracoid large; the furcula is very delicate, without hypocleidium; the upper end of the clavicle is not expanded, and has no precoracoid spur.

Notwithstanding what the French author says, the above features of the sternum of *Todus* cannot be predicated of all the Alcedinidæ, but some of them more especially belong to the Halcyoninæ. Not only in its small size, but also generally, *Ispidina* is sternally likest *Todus*: but even in it the likeness is not complete; for instance, in it the xiphoid processes are shorter and stouter, the keel advances more forwards, and with an almost straight anterior edge, and the furcula is stouter and has a large precoracoid process. Taken all in all, the sternum of *Eumomota* is uncommonly like that of *Todus*, only enlarged.

In the Bee-eaters (*Merops*) the keel is still longer, the rostrum broad. The Jacamars (*Galbula*), with xiphoids not unlike the Tody's, have a much shorter rostrum; while in the Barbets (*Capito* and *Megalaima*) it becomes unusually elongate, as does the internal xiphoid bar.

Amongst the Flycatchers, and notably such as *Todus* has been considered affine to, a trenchant distinction obtains, there being in their sterna but two xiphoid notches; the rostrum not only is powerful, but terminally deeply cleft; the precoracoid is greatly expanded; and there is a hypocleidium.

I have demonstrated in my 'Anatomical Monograph of the Kingfishers' that their pelvis presents two extremes of configuration:—one, *Dacelo* and the Halcyon group, where the præacetabular area is relatively narrow through deflection of the ilia; the other, *Ceryle* and the Alcedine group, the reverse, or widish anteriorly, and, upon the whole, flat on the dorsum.

Todus rather draws towards the former, and presents modification from *Ispidina* in wanting a marginal iliac process in front of the acetabulum, and in having more sacral perforations and deeper dorsal grooves—characters diagnostic of *Eumomota*. The Muscicapidæ do not show any very separate type of pelvis from the Tody. The Meropidæ incline to the broad pelvic contour characterizing *Ceryle* and *Alcedo*.

Bones of the Wing and Leg.

The humerus is by no means diminutive, considering the small size of the bird, and as contrasted with the femur is large. Whilst there is a general likeness to the humerus of the Kingfishers, it yet presents easy shades of difference, conspicuous when the bones are laid alongside each other. The head relatively is more flattened antero-posteriorly, and is set more at a right angle to the shaft, giving a pouting character thereby. The shaft, moreover, has greater torsion, the same existing in *Eumomota*—a fact best appreciated when the small-sized humerus of *Ispidina picta* is submitted to comparison.

I did not detect any special feature in the radius, ulna, and carpo-phalangeal bones, except as regards their relative lengths to each other.

Before speaking of the leg-bones themselves I shall advert to the limb as clothed with tegument.

There is a certain delicateness and tenuity in the foot; but the sole nevertheless manifests true syndactylism, inasmuch as two of the anterior toes, third and fourth digits, are closely united to about the proximal ends of their tertiary phalanges. On the dorsum of the foot a sulcus runs a little way further back, but is narrow and not deeply cleft. The fission between the second and third toes is greater, their union reaching to the near end of their second phalanges. The hind toe in its ordinary position appears to be set obliquely inwards and backwards from the root of the second—its natural inclination, as far as I could make out, being fully as much in the former as the latter direction. This fact is hardly so forcibly pronounced in Plate LV. fig. 7 as it ought to be, in consequence of my desiring to show the papillary padding.

In this specimen the respective sizes of the free portions of the toes, including claws, were, in decimal parts of an inch:—hallux 0·28, second toe 0·17, third 0·2, fourth 0·16; from the base of the hallux to the fork between second and third toes 0·13, and from the former point to the next cleft 0·22 inch, the latter therefore giving the extreme area of syndactylism.

As regards the tarsus, it is smooth and naked, a tendency to transverse wrinkling existing quite at the lower end and in front. The toes superiorly are clothed with subequal-sized quadriform scales, there being thirteen or fourteen on the middle anterior digit. A similar kind of tegument covers the sole; only the scales there are more circular and of a papillary character. The claws are laterally compressed with only moderate curvature.

I may pass over the femur with a mere word as to its very moderate strength and size. Regarding the tibia, its absolute length rather than stoutness is noteworthy; and this applies still more to the tarso-metatarse. There does not appear to be an osseous bridge connecting the inferior condyles of the tibia posteriorly, as in *Dacelo*, the tendons being confined by transverse ligamentous structure. The fibula, as usual, is short and spicular, but with a well-defined knobby head.

The grand limb-distinction between *Todus* and the whole of the Alcedinidæ consists in the former possessing a long tarsal segment—a feature which excludes it from the latter group, and retains it rather with the Muscicapidæ. In *T. viridis* it is of nearly equal dimensions with the tibia.

There is a slight grooving of the shaft anteriorly and superiorly; but posteriorly the scooping for tendons &c. is much deeper. The articular heads together present an oval surface with an absence of the flank process which obtains in the Daceloninæ: the central elevation is also feebly marked. The postero-calcaneal ridge, or hypotarsus, stands feebly out behind, is narrow, with a shallow dent

rather than a cleft, and a single foramen. Its distal or inferior end has trifid knuckles. The middle one is the largest, and a very trifle longer than the lateral ones, whilst its fissure is the deepest; so that in the inferior view there appear four condyloid eminences, and a fifth, counting the metatarsal element. The latter metatarsal piece of the tarso-metatarsus is relatively of fair size.

In small forms such as that I am dealing with, where there is great difficulty in instituting accurate comparisons with other skeletons, oftentimes but partially cleaned, the proportional lengths of the segments acquire paramount importance. The Tables I have constructed subserve better than lengthened verbal comparisons. I regret the want of a diminutive Motmot skeleton. I could have added a series of measurements and their proportions of the limbs of *Merops*, *Galbula*, &c., in my possession, but believe the genera now given sufficient for my purpose.

1. *Absolute lengths of the long bones of the extremities, in decimals of an inch, in* Todus *and some of its supposed allies.*

	Humerus.	Ulna.	Radius.	Meta-carpus.	Mid phalanges.	Extreme length.
WING.						
Todus (viridis)	0·6	0·7	0·7	0·3	0·2	1·8
Ispidina picta	0·7	0·9	0·85	0·3	0·25	2·15
Momotus brasiliensis	1·6	1·7	.....	0·7		
Eurylaimus nasutus	1·05	1·25	.....	0·55	0·5	3·35
Muscicapa grisola...	0·65	0·8	.....	0·4	0·3	2·15

	Femur.	Tibia.	Fibula.	Tarso-metatarse.	Mid-toe phalanges.	Extreme length.
LEG.						
Todus (viridis)	0·42	0·68	0·27	0·55	0·45	2·3
Ispidina picta	0·5	0·8	.....	0·3	0·4	2·0
Momotus brasiliensis	.....	1·8	.....	1·2		
Eurylaimus nasutus	0·9	1·4	.....	1·0	0·7	4·0
Muscicapa grisola...	0·55	0·9	.....	0·6	0·45	2·5

The mode of measurement of the above is the same I have adopted in the Kingfishers (*l. c.* p. 53), where I state:—"In estimating the extreme length of the wing the radius has been excluded, and the sum of the other bones added together to obtain the approximate results. With the exclusion of the fibula the leg's length has been similarly reckoned. Concerning the ulna's long diameter the olecranon process has not been included, nor has the depending outer process of the metatarsus been taken into account. These extra processes, so to speak, exceed the actual jointed leverage of the individual

pieces composing each limb, and hence are omitted to ensure correspondence in the calculations of the relative length of the leg."

2. *Proportions of the wing-bones to each other.*

	Ulna to humerus, latter = 100.	Metacarpus to humerus, latter = 100.	Mid digit to humerus, latter = 100.
Todus (viridis)	116	50	33
Ispidina picta	128	43	35
Momotus brasiliensis	109	43	
Eurylaimus nasutus	119	52	47
Muscicapa grisola	123	61	46

3. *Proportions of the leg-bones to each other.*

	Tibia to femur, latter = 100.	Tarso-metatarse to femur, latter = 100.	Mid anterior toe to femur, latter = 100.
Todus (viridis)	162	131	107
Ispidina picta	160	60	80
Eurylaimus nasutus	155	111	77
Muscicapa grisola	163	109	81

4. *Relations of bone-segments to the entire length of the wing.*

	Wing = 100, proportionate length of humerus to it.	Wing = 100, proportionate length of ulna to it.	Wing = 100, proportionate length of metacarpus to it.	Wing = 100, proportionate length of mid digit to it.
Todus (viridis)	33	39	16	11
Ispidina picta	32	42	13	11
Eurylaimus nasutus	31	37	16	15
Muscicapa grisola	30	37	18	14

5. *Relations of bone-segments to the entire length of the leg.*

	Leg = 100, proportion of femur to it.	Leg = 100, proportion of tibia to it.	Leg = 100, proportion of tarso-metatarse to it.	Leg = 100, proportion of ant. mid toe to it.
Todus (viridis)	18	29	24	19
Ispidina picta	25	40	15	20
Eurylaimus nasutus	22	35	25	17
Muscicapa grisola	22	36	24	18

6. *Relative proportions of the several segments of the wing to their homologues of the leg, and of the one entire extremity to the other.*

	Humerus = 100, proportion of femur to it.	Ulna = 100, proportion of tibia to it.	Metacarpus = 100, proportion of tarso-metatarse to it.	Mid digit wing = 100, proportion of mid anterior toe to it.	Wing = 100, proportionate length of leg to it.
Todus (*viridis*)	70	97	183	225	128
Ispidina picta	71	87	100	160	93
Momotus brasiliensis	...	102	171		
Eurylaimus nasutus	86	112	182	140	116
Muscicapa grisola .	85	112	150	150	116

Excepting in shortening of wing-digit, an Ispidine character, Table 2 demonstrates that *Todus* exhibits proportions of individual arm-bones likest the Flycatchers.

As to the wing-segments, and their reference to that extremity as a whole (Table 4), the characters throughout are much akin, the elongation of the ulna of *Ispidina* being a trifle in excess of its brethren the Kingfishers.

Among the leg-bones one to the other (Table 3) the difference of tibia to femur is not so manifest; but in tarso-metatarse to femur there is a wide distinction, the Tody even far surpassing *Eurylaimus*. It is noticeable in the former also that the middle toe acquires undue preponderance. This abnormal elongation is apparently modified when the comparison or the length of the digit with the proportional height of the entire leg is taken into account.

Thus collated (*vide* Table 5), the tarso-metatarse of *Todus* still retains a magnitude corresponding to what obtains among the Flycatchers, but, contrariwise, a decrease of femoral length even below these latter and all the genera of Coccygomorphæ examined by me. In the last set of calculations (Table 6), humerus *versus* femur, it is shown that the Tody and Kingfisher are partners. The same well nigh holds good in the proportion of the tibia to the ulna; and the Motmot comes betwixt the Tody and the Flycatcher. That peculiar feature of *Todus*, tarso-metatarsal length, is very conspicuous when collated with corresponding metacarpal size, and it becomes apparent that the Motmot and Tody embrace the Eurylaimidæ and Muscicapidæ, and disjoin themselves from the whole of the Kingfishers; for I must observe that *Ispidina* stands aloof from its tribe in the above respect.

The ratio of the entire length of the leg to the wing serves to point out that even the Muscicapidæ have it shorter than *Todus*; and I may further assert from my researches that not one of the Kingfishers comes near the former group in this peculiarity.

I am not oblivious to the fact that such arithmetical generalizations are founded on limited data; but they nevertheless explain several points which were a puzzle to me. The Rose-cheeked Kingfisher

is most aberrant in some of its limb-dimensions, and so, indeed, are the Stork-billed Kingfishers; but these very abnormalities serve to smooth vexatious questions of consanguinity, and act as supports to the chain of affinities uniting other characters.

Todus *and its kindred.*

"Les Todiers sont de petits oiseaux d'Amérique, assez semblables aux Martins-pêcheurs pour la forme générale, et qui en ont aussi les pieds et le bec alongé, mais où ce bec est aplati horizontalement, obtus à son extrémité, le tarse plus élevé, et la queue moins courte."

Such was Cuvier's* notion of these birds, a judgment not acquiesced in by many subsequent writers. Among pure ornithologists, however, Vigors† seems to have followed in the wake of Cuvier, and in his 'Fissirostres' places the Todidæ between the Caprimulgidæ and Halcyonidæ. *Eurylaimus* is his connecting link between the Tody and the Goatsuckers, though to *Halcyon*, according to him, there is more intimate resemblance.

Lesson‡, it appears, believed in the genus having great approximation to the Kingfishers through *Todyrhamphus*, yet doubtfully disposes of it betwixt *Platyrhynchus* and *Myiagra*. The acute and original-minded Nitzsch§, from his pterylographic studies, makes a group Todidæ, wherein *Coracias*, *Merops*, *Prionites*, *Todus*, and *Galbula* are respectively included as subdivisions. The Motmot and Tody are associated on account of having a spinal tract without a space. Temminck's‖ arrangement is as follows:—*Rupicola*, *Pipra*, *Pardalotus*, *Todus*, *Platyrhynchus*, *Muscipeta*, *Muscicapa*.

Bonaparte¶ gives a subfamily to the Todinæ, the genus *Todus* coming between *Psaris* and *Todirostrum*, the family of the Todies having position after the Cotingidæ and Eurylaimidæ. In Gray's 'Genera of Birds' *Todus* comes under the Coracidæ; this is followed by the Trogonidæ, and then the Alcedinidæ In the same writer's recent 'Hand-List of Birds,' 1869, the grouping runs, Coracidæ, Eurylaimidæ, Todidæ, Momotidæ, Trogonidæ, Bucconidæ, Alcedinidæ, Meropidæ, and Galbulidæ. Another ornithologist, Mr. Swainson**, has devoted a volume to the Flycatchers, wherein *Todus* is assigned a nearly central position—*Megalophus* and *Platyrhynchus* coming on the one hand, *Lepturus*, *Muscipeta*, &c. on the other. *Todus*, as Swainson takes it, is preeminently typical and a standing proof of the correctness of his ornithological circular system.

As a naturalist whose observations have been made amongst forest and glade, Mr. Wallace†† takes a high place. His conclusions are as

* Règne Animal.
† Linn. Soc. Trans. (1822-3) vol. xiv. p. 431.
‡ Manuel d'Ornith. vol. i. p. 179.
§ 'Pterylographie,' and Engl. ed. Ray. Soc. 1868, p. 89.
‖ 'Manuel d'Ornithologie,' 2nd ed. (1820), part i. p. 65.
¶ 'Conspectus Generum Avium,' p. 182.
** 'Naturalist's Library,' Birds, vol. xiii.
†† Ann. & Mag. of Nat. Hist., Sept. 1856, p. 200. In this masterly essay Mr. Wallace most logically discountenances Swainson's "circular arrangement" as untenable.

undernoted:—"The little Todies of the W. Indies have also been usually classed as Fissirostres; but their moderately long and slender legs, short rounded wings, and their excessive activity on their feet are so totally opposed to the characters of every other member of that group that we think them far more naturally associated with such Flycatchers as *Todirostrum* and *Megalophus*."

M. E. Blanchard, to whom allusion has already been made, from his osteological research, says (*l. c.* p. 122):—"On trouvera dejà singulièrement justifiée l'opinion émise par Cuvier au sujet des affinités naturelles des Todiers." According to sternal characters he ranges the Kingfishers, Tody, Jacamars, and Bucco in succession. I may furthermore cite Mr. Eyton, who, in his 'Osteologia Avium,' under the family Alcedinidæ, places as subfamilies Alcedinæ, Halcyoninæ, Galbulinæ, Meropinæ, Todinæ, and Coracinæ in sequence. Lastly, Dr. Sclater in a curt notice*, seems to indorse Blanchard's view, whose figures of sterna he copies, when he says—"*Todus* is closely allied to *Alcedo* and still more to *Momotus*, its nearest living ally being certainly the diminutive Motmot called *Hylomanes momotula*." Without expressing the reasons wherefore, he concludes—"That the Todidæ should be constituted a family of the Coccygomorphæ, in the immediate neighbourhood of the Momotidæ." The connexion of these two, as I have noted, Nitzsch long ago advocated from their pterylosis; and they have since been placed side by side by Mr. George Gray.

It would seem, then, that where outward appearance has swayed, naturalists judged *Todus* as having alliance with the Flycatchers or the Motmots; but where anatomical evidence has been relied on, the Kingfishers and Bee-eaters are the groups with which it carried family likeness. My own studies elicit a certain unanimity out of this cross fire of opinions.

Todus is inconsistent in several respects. The habits, food, and build or form are mainly those of the Muscicapidæ. The coloration partially belongs to that group, and partially leads to some of the Alcedinidæ. The long slender tarsus, its scale-covering, and the figure of the wings associate it with the Flycatchers and such insectivorous birds; but the syndactylous disposition of the foot is rather that of the Kingfishers. The shape and the length of the bill does not quite justify such paternity; for although it has been asserted to be truly Halcyonine, I regard it as *sui generis*—a kind of compromise with the last, tinctured wonderfully with Muscicapine, Momotine, Meropine, Galbuline, and Buccine tendencies. The rictal bristles, though short and weak, markedly take the genus away from the Kingfishers and betoken connexion with the Barbets and Flycatchers. The minutely serrate mandible correlates it to the Motmots. Regarding pterylosis, as we have mentioned, Nitzsch places it between the Motmots and Jacamars. But I would observe that in the fact of there being only 19 remiges, we have a number belonging to *Psaris*, *Platyrhynchus*, and *Tyrannus*, instead of from 21 to 23 pertaining to the group where *Todus* is put by the German ornithologist. I own, on

* 'Ibis,' April 1872, p. 179.

the other hand, that the feather-tracts are not after the disposition of the Muscicapinæ.

When we come to test skeletal relations, the first question is whether it be Ægithognathous or Desmognathous; and to the latter it must be assigned. This seemingly settles the matter as to Passerine kin; yet as in externals, so internally there are ties denoting osteological development after the type of the Muscicapidæ rather than Alcedinidæ and allies. Such are the large vacuities in the horizontal palatal plates, the short inward set of the pterygoids, the large patent nares, the brain-elevation, the membranoid condition of the ali- and orbito-sphenoids, the non-ossification of the interorbital septum, the shape and set of the lachrymals, the occipital contour, the shallow squamoid groove, the vertebral numbers, the humeral torsion, the spineless anteiliac margin, the shape of hypotarsus, and, lastly, tarsal elongation. Though so numerous seem the discrepancies, they are nevertheless counterbalanced and overmatched by osteological organization assigning kindred to the Coccygomorphine group.

It results, then, from my investigation and a summing up of the labours of others that *Todus* is a Coccygomorph. Its nearest living allies undoubtedly are the Motmots and Kingfishers; but it presents such aberrance that it ought not to be ranked amongst either, but in proximity as a separate division of the Coccygomorphæ—the Todidæ, equivalent to the Momotidæ. As I interpret avine forms, a tithe only of which are known (for who can say what fossil remnants are yet to be dug up), we cannot be positive of the direct lineage that any abnormal group specially were derived from. Here I shall urge the remarkable ramifications affiliating the Tody with genera of the most diverse sorts—*Momotus, Ispidina, Myoceyx, Alcyone, Muscicapa, Cymbirhynchus, Platyrhynchus, Merops, Galbula, Capito*, &c., all more or less, one might say, tainted with parent blood. This forces on me the conviction how difficult it is to divine from limited data the descent and nearest kindred of many of those so-called aberrant forms, be they Bird, Mammal, or Reptile; so that the vital stock and the *modus operandi* of differentiation are as yet hidden, which palæontology and the study of development may one day help us to unravel.

It may be presumed that *Todus* comes of Halcyonine lineage, though its organization places it in juxtaposition with the Motmots. It moreover offers structure so truly Passerine as to mask its more direct allies; and such exterior points deceived the older naturalists or were too strongly insisted on.

The Todidæ.

Coccygomorphs characterized by:—Naked oil-gland; feathers with diminutive aftershaft; spinal tract simple, dilated behind scapulæ; each moiety of ventral tract posteriorly tenuous, with wide pectoral and humeral branches. Tongue thin, tapering; stomach muscular; intestines short and with cæca. Right and left carotids; lower larynx simple, with a pair of muscles. Feet syndactyle; first

toe reversed; claws short; tarso-metatarse very long; hypotarsus with one foramen. Sternum short, broad; four wide xiphoid clefts; upper end of furcula narrow, and no hypocleidium; epicoracoid large; coracoid exceeding the oblique sternal diameter. Præmaxillæ long, wide, straight, and low; nares elliptical, large; a great interorbital space; brain-segment high and full; postfrontal and zygomatic processes short; maxillo-palatines large, spongy, with intervening cleft; postpalatal processes absent; and anterior, elongate, wide, horizontal palatal spaces obtain; lachrymals spongy, without upper retrocurrent limb; basipterygoids none; pterygoids relatively short; mandible flat, symphysis large and broad; horny margins minutely toothed.

Habitat of typical and only known (?) genus *Todus*, Tropical America.

EXPLANATION OF PLATE LV.

Separated skeleton of a species of Tody (*Todus viridis*), showing the most characteristic views of its osseous framework, twice their natural dimensions. All the segments, save the ribs and cervico-dorsal vertebræ, are represented.

Fig. 1. The skull from above.
Fig. 2. The inferior base of the same.
Fig. 3. A profile view of the cranium with the mandible.
Fig. 4. Occipital facies of the skull.
Fig. 5. Upper or oral surface of the mandible.
Fig. 6. The lachrymal bone of the left side, seen from behind.

Lettering applicable to the above:—*n*, nasal bone; *l*, lachrymal; *mxp*, maxillo-palatine; *mx*, maxillary; *pt*, pterygoid; *q*, quadrate; *p*, palatal plate, *e* being the external and *i* the internal anterior palatal processes; *ios*, interorbital space; *pf*, postfrontal processes; *z*, zygomatic process.

Fig. 7. The sole and tarsus of the right foot, with the tegumentary covering. I, II, III, IV, the digits respectively.
Fig. 8. A front view of the bones of the same: *tm*, tarso-metatarse; *m*, metatarsal element.
Fig. 9. Posterior surface of the right humerus: *h*, an upper view of its head, and *c*, the inferior end or condylar aspect.
Fig. 10. Ulna (*u*) and radius (*r*).
Fig. 11. Metacarpus and phalanges, from in front of left wing: I, pollex; II, distal phalanges of second digit; m^1, m^2, partially united metacarpals.
Fig. 12. Left femur from behind.
Fig. 13. Right tibia (*t*) and fibula (*f*) from in front.
Fig. 14. Upper or proximal end of the tarso-metatarse.
Fig. 15. Lower or distal extremity of the same.
Fig 16. Lateral aspect of the sternum and shoulder-girdle: *c*, costal process; *r*, rostrum.
Fig. 17. Inferior view of the same.
Fig. 18. Interior of the pelvis and under surface of the tail-vertebræ.
Fig. 19. External pelvic side view.
Fig. 20. Dorsal aspect of the pelvis and termination of the spine.

June 4, 1872.

Prof. Flower, F.R.S., V.P., in the Chair.

Mr. G. Dawson Rowley, F.Z.S., exhibited a specimen of the North-American *Zonotrichia albicollis*, which had been taken alive in a clap-net on the 22nd of March, 1872, at Beven Dean, near Brighton, by a man catching Yellow-hammers (*Emberiza citrinella*), with which the *Zonotrichia* was in company. One previous occurrence of this species in Great Britain had been already recorded in the Society's 'Proceedings' for 1870 (p. 52).

Mr. Sclater exhibited the "American Cuckoo killed in Ireland," which had been referred by Mr. Blake-Knox (Zoologist, 1872, p. 2943) to the Yellow-billed *Coccyzus* (*C. americanus*), and by Lord Clermont subsequently (Zool. p. 3022) to the Black-billed species (*C. erythrophthalmus*), and remarked that there could be no question of the latter determination being correct.

The only previously recorded occurrence of this species in Europe was that of a specimen killed in Italy some years ago*.

The Secretary read the following extracts from a letter addressed by Capt. Henry Pain, of the S.S. 'Scanderia,' to Mr. F. Coleman of the Falkland-Islands Company, containing remarks on the habits of the Sea-lion (*Otaria jubata*) and the Fur-Seal of the Falklands (*O. falklandica*):—

"Of course you know there are many kinds of Seal in the South Seas—*more* than are generally known, for at different times I have seen animals that neither I nor any one else on board had seen before; but the principal are the Sea-lion, Sea-elephant, Sea-leopard, and the Fur-Seal which *I* call the Sea-fox.

"The Sea-lion attains its full growth at nine years, and annually comes back to the place it was born to breed and to shed its hair. The former operation occurs between the 25th of December and the 15th of January, the latter in April and May. The Lions commence to arrive at their 'rookery' in November to wait for the females, who do not haul up until within two or three days of pupping; they are fatter at this time than at any other, and have to take in a quantity of ballast to keep them down, without which they could not dive to catch fish. I have opened them at this time, and found in a pouch they have inside upwards of twenty-five pounds of stones, some as large as a goose-egg. As they get thin they have the power of throwing these stones up, retaining only a sufficient quantity to keep them from coming up too freely to the surface.

"They are very savage in the breeding-season, and are continually

* See Bolle, J. f. Orn. vi. p. 457 (1858); De Selys-Longchamps, Ibis, 1870, p. 452; and Salvadori, Fauna d'Italia, Uccelli, p. 42 (1871).

fighting, biting large pieces out of each other's hide, and sometimes killing the females. At this time they become an easy prey to man, as they will stand and be killed without trying to get away.

"The Lioness has her first pup at three years of age, never more than one at a time, and comes up to have intercourse with the Lion at two, and as soon as the pup is born; at no other time but the breeding-season do they have sexual intercourse. They suckle their young five months before they are taken to sea, by which time the pup has shed its first hair. Before the mother takes her pup to fish she has to ballast it, and I have seen a Lioness trying for hours to make her pup swallow small stones at the water's edge.

"The female keeps her pup with her until two or three weeks before the next breeding-season, when she drives it from her. About this time the yearlings will be found some few miles from the old rookery.

"The Sea-lions must live to a great age, for where a rookery was broken up by the American sealers forty years ago, I myself have seen a few old Lions haul up year after year, waiting in vain for the females that were killed years before. This proves that they never, unless they are very much worried, leave altogether the place where they were born.

"The Lions stay as long as two months on shore during the breeding-season without going into the water. During that time their fat gives them sufficient nourishment. After the season is over some of them are so thin and weak that they are but just able to crawl into the water. I have killed them in this state, and not one particle of stone have I found in them.

"Only in one case have I seen a boat attacked by a Lion, and that was when a harpoon was stuck in it. As soon as a check was given to the line he sprang at the boat, seized the gunwale with his teeth, and tore nearly the whole length of it off one side.

"The Fur-Seal, which I call the 'Sea-fox,' is a much more cunning and sharper Seal than any other I have seen. It has a sharper nose, larger ears, and is quicker in its movements than the Common Seal. They generally breed on some isolated rock, a month earlier than the Common Seal, and finish shedding their old hair in March; their habits are the same as the Lions as regards pupping, intercourse, &c.

"I have seen them, when men have been stationed on their rookery to shoot them as they come up, produce their pup in the water, take it in their mouth before it could drown, and place it on the rock, and then swim away until dark, when they return to suckle it.

"The male Fur-Seal (which we call a Wig), although it is much smaller than the Sea-lion, yet when they fight (which often happens in the breeding-season) is always the victor."

Prof. Owen, F.R.S., read the nineteenth of his series of memoirs on the extinct birds of the genus *Dinornis*. This portion contained the description of a femur, indicative of a new genus of large wingless birds allied to *Dromæus*, and proposed to be called *Dromornis austra-*

lis, which had been discovered in a post-tertiary deposit in Queensland.

This paper will be published entire in the Society's 'Transactions.'

A communication was read from Dr. John Anderson, F.Z.S., Curator of the Indian Museum, Calcutta, on the osteology and dentition of *Hylomys*.

After describing the osteology and dentition of this animal at full length, Dr. Anderson concluded his observations as follows:—

"From the foregoing description of this remarkable form it would seem to be more closely allied to *Gymnura* and *Erinaceus* than to *Tupaia*, however much in general form it resembles the last-named genus, from which it is widely separated in the details of its structure. Witness how different the pterygoid region of the skull is from that which occurs in *Tupaia*, and in contrast to the character of which may be enumerated its imperfect tympanic bullæ, its slightly excavated basisphenoid, its paroccipital and mastoid processes, the imperfect orbit, the ridge before the latter, the imperforate molar, the palate without defects of ossification, and its dentition—besides other details of its skull, all of which, along with the foregoing, demonstrate that its nearest affinity is with *Gymnura* and through it with *Erinaceus*. Added to these are the characters of its scapula and pelvis, which resemble the corresponding structures in *Gymnura*; and, like the latter, *Hylomys* has the important feature of a united tibia and fibula."

This paper will be published entire in the Society's 'Transactions.'

The following papers were read:—

1. Note on the Anatomy of the Two-spotted Paradoxure (*Nandinia binotata*). By Prof. W. H. Flower, F.R.S., V.P.Z.S.

[Received May 17, 1872.]

The presence or absence of a cæcal appendage to the intestine has been generally held to be a character of some value in proving zoological affinities, and has frequently been made use of in classification. In the order Carnivora, for example, the absence of a cæcum has hitherto been so constantly found associated with certain structural characters of the osseous, nervous, and generative systems, by which the Bear-like or Arctoid subdivision of the order is distinguished, and its presence is so universal in the various other members of the order, that the correlation seemed as well established as any other empirical generalization in zoology; and it would have seemed perfectly safe to have predicated before dissecting any member of the family *Viverridæ* that a cæcum would be found, even if it should be in the comparatively rudimentary state in which it exists in the Binturong (*Arctictis*).

In the ordinary Paradoxures especially the cæcum is rather better developed than in the true Civets; and therefore it was with con-

siderable surprise that I found in dissecting a specimen of *Nandinia binotata* (an animal frequently associated with them generically) not a trace of this organ. The specimen was a male which died in the Society's Gardens on the 28th of January last, having lived in the menagerie for upwards of two years. Its length from nose to root of tail was 18 inches; the length of the intestine from pylorus to anus was 66 inches, and it had an average diameter, when moderately distended, of $\frac{7}{10}$ inch. At a distance of 8 inches from the anus, in the situation where the cæcum might be expected, the intestine presented a very slight constriction, immediately below which its calibre was somewhat increased. The mucous membrane also at this spot underwent the changes in character usually found in those Carnivora in which the cæcum is absent, including the disappearance of the villi characteristic of the small intestine. The spot was also marked, as is usually the case, by the inferior termination of the lowest and largest of the agminated or Peyer's glands, which occupied a tract of mucous surface 2 inches long and $\frac{1}{4}$ inch in width.

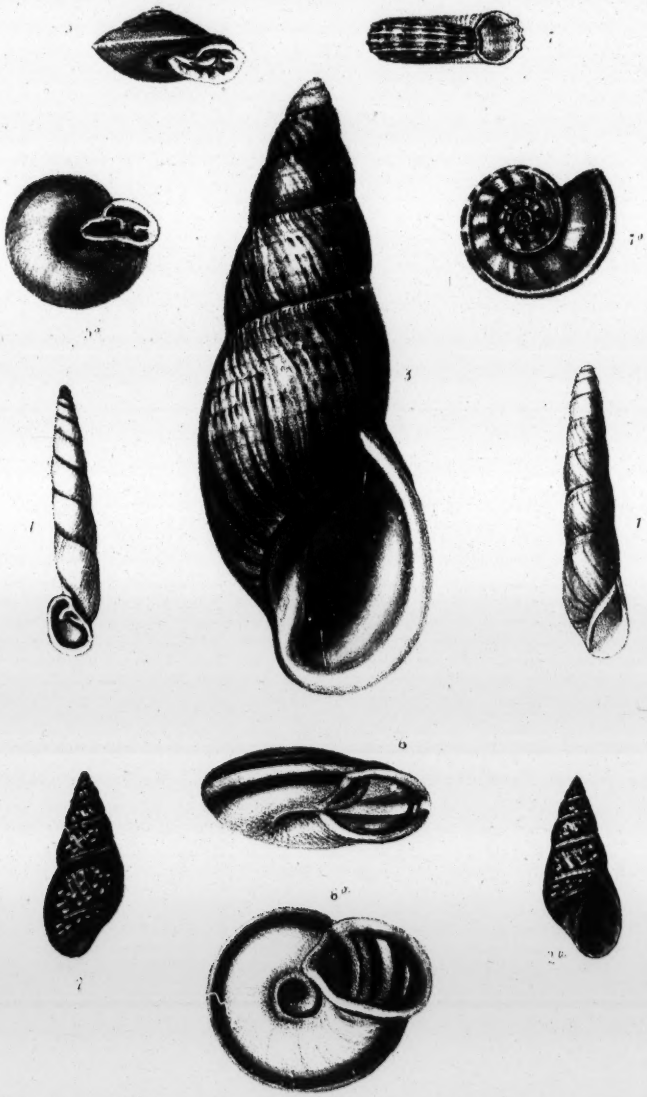
The other characters by which *Nandinia* (Gray) differs from *Paradoxurus* are the smaller size and more pointed cuspidation of the molar teeth (upon which the genus was established), its peculiar habitat (being West-African, whereas all the true Paradoxures are Asiatic), and the persistence throughout life of the cartilaginous condition of the posterior chamber of the auditory bulla. In the last character it differs from all known Carnivora. When I first met with this peculiarity I thought that it must be individual; but as it has occurred in every skull examined, some of them (as in the specimen above referred to) evidently quite adult, there seems to be no doubt as to its constancy.

Besides the ordinary anal glands, common to Carnivora generally, *Nandinia* resembles many of its allies in possessing a special superadded cutaneous scent-gland, in the form of a longitudinal median depression an inch in length, with tumid naked margins and looking very like a vulva, situated in the pubic region, immediately in front of the short, conical, retroverted, hairy prepuce.

It is worthy of notice that the organs of generation present no approach to the type characteristic of all known Arctoid Carnivora: the prostate is large and bilobed; there are distinct Cowper's glands; the penis is small and directed backwards, and contains a bone not exceeding ·35″ in length. These and the cranial characters leave no doubt as to the *Nandinia* truly belonging to the family in which it has usually been placed.

PS. Since the above was written, Mr. Garrod has forwarded to me the viscera of another specimen of the same species, which died in the Society's Gardens on the 21st of May, in which the characters of the alimentary canal are similar to those above described, except that the circular constricting band between the ileum and colon was rather more marked, and formed a distinct prominence when the intestine was laid open. Below this there was a slight dilatation of the coats of the colon, but nothing which could properly be called a cæcum.

BIBLIOTECA
2500073
UNIVERSITARIA



M.&N.Hanhart imp.

NEW SHELLS FROM ECUADOR

2. Description of new Species of Shells discovered by Mr. Clarence Buckley in Ecuador. By Edmund Thomas Higgins, F.Z.S. &c.

[Received May 14, 1872.]

(Plate LVI.)

Thinking that the untiring energy and perseverance of Mr. Buckley deserve more than a mere passing notice, I have named two species of shells and a subgenus after him. I append a list of the principal species obtained by him during his last journey in Ecuador.

Rumina (Stenogyra) pairensis, sp. nov. (Plate LVI. fig. 1.)

R. *testa imperforata, turrita, tenuiuscula, lævigata, oblique striata, luteo-fulva; spira turrita, apice obtuso, sutura crenulato-marginata; anfr.* 10 *planatis, ultimo* ¼ *longitudinis subæquante, basi attenuato; columella callosa, leviter arcuata; apertura obliqua, acuminato-ovali; perist. simplici, recto, margine dextro subsinuato.*
Long. 47, lat. 9 mill.
Hab. Paira.

Otostomus loxanus, sp. nov. (Plate LVI. figs. 2, 2*a*.)

O. *testa subperforata, ovato-fusiformi, tenuiuscula, longitudinaliter plicato-striata, obscure spiraliter striolata, griseo fusca, fasciis castaneis et lineis luteis cincta, punctis luteis irregulariter conspersa; spira subconvexo-conica, apice acutiusculo, sutura distincta; anfr.* 7, *convexiusculis, ultimo quam spira paulo breviore, basi attenuato rubido; apertura parum obliqua, acuminato-ovali, intus castanea, punctis et lineis pellucentibus, margine rubido; columella substricta, minute granulosa, rubida; perist. simplici, recto, margine basali subexpanso, columellari superne dilatato, subappresso, fornicato, reflexo.*
Long. 29, diam. 11 mill.; apert. 14 longa, 6 lata.
Hab. Loxa.

Orthalicus (Porphyrobapha) buckleyi, sp. nov. (Plate LVI. fig. 3.)

O. *testa imperforata, oblongo-conica, solida, costis rugosis longitudinalibus irregularibus et lineis confertis spiralibus irregulariter valde impressis sculpta; subepidermide flavido-fulva, carneo-rufescente, strigis rufo-fuscis longitudinaliter ornata; spira conica, apice obtuso, sutura albida; anfr.* 7, *convexiusculis, duobus primis minute granuloso-striatis, ultimo spiram subæquante, basi attenuato; columella crassa, basi torta, carnea; apertura subverticali, acuminato-oblonga, intus saturate roseo-livida; perist. incrassato, expanso, breviter reflexo, extus albido, marginibus callo nitido tenui junctis.*

Long. 93, lat. 36 mill. ; apert. 37 mill. longa, 17 lata.
Hab. San Lucas.

CLAUSILIA (NENIA) BUCKLEYI, sp. nov. (Plate LVI. fig. 4.)

C. *testa non rimata, elongato-fusiformi, tenui, subdiaphana, lineis elevatis confertis oblique sculpta, pallide fulva ; spira regulariter attenuata, apice acutiusculo, sutura impressa ; anfr.* 11 *primis convexis, cæteribus planiusculis, ultimo paulum angustiore, antice soluto, basi rotundato ; apertura verticali, ampla, oblique pyriformi-ovata, fauce purpurea ; lamella supera valida, infera mediocri, lunella nulla ; plica palatali et subcolumellari inconspicuis, perist. tenui, continuo, libero, undique late expanso.*
Long. 43, diam. 6 mill. ; apert. 9 mill. long., 6 lata.
Hab. Macas.

LABYRINTHUS MANUELI, sp. nov. (Plate LVI. figs. 5, 5*a*.)

L. *testa mediocriter umbilicata, depresso-conoidea, solidiuscula, acute carinata, striata et subtilissime granulata, saturate castanea ; spira conoidea, obtusa, sutura leviter impressa ; anfr.* $5\frac{1}{2}$, *subplanis, ultimo antice subito deflexo, pone aperturam profunde scrobiculato, basi convexo ; apertura valde obliqua, auriformi, ringente ; perist. continuo, albo, expanso, subreflexo, ad anfr. penultimum sinuoso, medio laminam erectam latam emittente, margine basali medio subsinuato, parte sinistra dentem obtusum, parte dextra dentem compressum acutum munita.*
Diam. maj. 28, min. 25. alt. 13 mill.
Hab. Macas.
Named after Manuel Villagomez, the servant of Mr. Buckley during his two journeys in Ecuador.

HELIX (AGLAIA) MACASI, sp. nov. (Plate LVI. figs. 6, 6*a*.)

H. *testa aperta, umbilicata, depressa, solidiuscula, oblique leviter plicato-striata, (sub lente) concentrice minutissime striolata, et supra liris nonnullis sculpta, albida, fasciis tribus castaneis ornata ; spira paulum elevata, apice subplanato, sutura valde impressa ; anfr.* 5, *convexiusculis, ultimo antice deflexo ; basi convexo, apertura valde obliqua, ovato-lunari ; perist. reflexo, marginibus conniventibus, callo tenui junctis.*
Diam. maj. 35 mill., min. 29, alt. 15.
Hab. Macas.

APEROSTOMA MONTEZUMI, Hidalgo. (Plate LVI. figs. 7, 7*a*.)

This peculiar species of *Aperostoma* differs so completely from every other known, that I have considered myself justified in making it the type of a subgenus, which may be characterized as follows :—

Genus APEROSTOMA.

Subgenus BUCKLEYIA.

Testa discoidea, tenuiter utrinque excavata, omnes anfractus exhibens,

carinis quatuor circumdata, epidermide decidua induta; apertura verticalis, circularis, continua, ad anfractum penultimum adnata; perist. tenui, recto, acuto.

The following is a list of the land-shells collected by Mr. Buckley in Ecuador:—

Melania (*Hemisinus*) *osculati*, Villa.
Paludomus cerasium, Hanley.
Glandina dactylus, Brod.
—— *saccata*, Pfr.
Bulimus anthinanensis, Pfr.
—— *bifulguratus*, Reeve.
—— *bourcieri*, Pfr.
—— *cardinalis*, Pfr.
—— *catlowia*, Pfr.
—— *chimborasensis*, Reeve.
—— *coloratus*, Nyst.
—— *colopaxiensis*, Pfr.
—— *cuneus*, Pfr.
—— *du burghei*, Reeve.
—— *expansus*, Pfr.
—— *fallax*, Pfr.
—— *felix*, Pfr.
—— *floccosus*, Spix.
—— *fraseri*, Pfr.
—— *fucatus*, Reeve.
—— *fungairinoi*, Hidalgo.
—— *fusoides*, D'Orb.
—— *gallina-sultana*, Chev.
—— *guerinii*, Pfr.
—— *guttulata*, Pfr.
—— *hartwegi*, Pfr.
—— *irroratus*, Reeve.
—— *membielinus*, Crosse.
—— *murrinus*, Reeve.
—— *peelii*, Reeve.
Bulimus piperitus, Sow.
—— *quitensis*, Pfr.
—— *riparius*, Pfr.
—— *sachsei*, Pfr.
—— *saturnus*, Pfr.
—— *taylorianus*, Pfr.
—— *thompsoni*, Pfr.
Orthalicus pfeifferi, Hidalgo.
Helix æquatoria, Pfr.
—— *æquatoriana*, Pfr.
—— *bituberculata*, Pfr.
—— *farrisi*, Higgins.
—— *flora*, Pfr.
—— *furcillata*, Hupé.
—— *moreletiana*, Pfr.
—— *scalenostoma*, Pfr.
—— *stenostrepta*, Pfr.
Cyclotus bogotensis, Pfr.
—— *crosseanus*, Hidalgo.
—— *dunkeri*, Pfr.
—— *fischeri*, Hidalgo.
—— *granulatus*, Chitty.
Bourciera fraseri, Pfr.
—— *heliciniformis*, Pfr.
Proserpina swiftii, Bland.
Anodon chiquitana, D'Orb.
Mycetopus siliquosus, D'Orb.
—— *subsinuatus*, Sow.
Leila parishii, Gray.
Castalia cordata, Humph.

DESCRIPTION OF PLATE LVI.

Fig. 1. *Rumina* (*Stenogyra*) *pairensis*, sp. nov., p. 685.
2, 2*a*. *Otostomus loxanus*, sp. nov., p. 685.
3. *Orthalicus* (*Porphyrobapha*) *buckleyi*, sp. nov., p. 685.
4. *Clausilia* (*Nenia*) *buckleyi*, sp. nov., p. 686.
5, 5*a*. *Labyrinthus manueli*, sp. nov., p. 686.
6, 6*a*. *Helix* (*Aglaia*) *macasi*, sp. nov., p. 686.
7, 7*a*. *Apercstoma montezumi*, p. 686.

3. Additional Notes on rare or little-known Animals now or lately living in the Society's Gardens. By P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received May 17, 1872.]

(Plates LVII.–LIX.)

In finally revising the new list of Vertebrata now or lately living in the Society's Gardens, I have found it necessary to investigate again the history of certain rarer species either incorrectly determined or not included in the first proof of the 'List.' I have therefore a few notes to offer to the Society supplementary to those already given in the 'Proceedings' for last year*.

1. Ateles rufiventris, sp. nov. (Plate LVII.)

Ateles vellerosus, Sclater, P. Z. S. 1871, p. 478 (err.).

The young female Spider Monkey received April 11th, 1871, and doubtfully referred, in my report on the additions for that month (P. Z. S. 1871, p. 478), to *Ateles vellerosus*, being since dead, I have been able to examine it more closely, and I now exhibit its skin. It is certainly not *A. vellerosus*, that species being the Mexican representative of *A. beelzebuth*, which I have lately redescribed and figured in the Society's 'Proceedings' (see *antea*, p. 5, Pl. II.); and I must, though unwillingly, give it a new name, as I cannot refer it to any described species.

I should have been inclined to suppose it to be possibly a variety of *A. ater*, had it not been for its flesh-coloured face. There is, however, no difficulty in believing that a distinct species of *Ateles* may be found on the Atrato river, where this was procured; and the adult animal may exhibit the specific characters more strongly. The species may be diagnosed as follows:—

Ateles rufiventris, sp. nov.

Ater: gastræo rufescente: facie carnea: pilei pilis elongatis projectis, in fronte ipsa retroversis: long. corp. 12, *caudæ* 15·5: *manuum pollice nullo.*

Hab. Columbia, in ripis fl. Atrato.

2. Saimaris usta, Is. Geoffr.

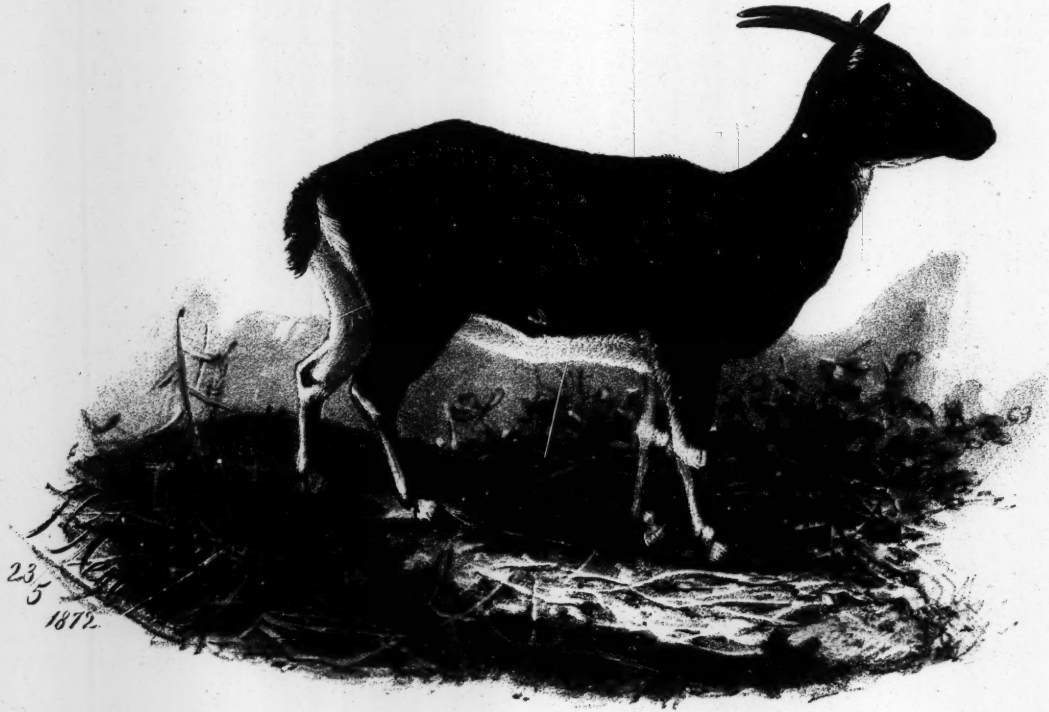
On the 4th of July last year we received "on deposit" a Squirrel Monkey, which is still living in the Monkey-house. This little animal has interested me much, as being quite new to me, and readily known from the somewhat variable *Saimaris sciurea* (of which we have frequently received specimens) by its naked ears. It is no doubt the *Saimaris usta* of Is. Geoffroy (Arch. d. Mus. iv. p. 6, t. 1); but as Wagner has reunited this species to *S. sciurea*†, I think it

* See P. Z. S. 1871, pp. 221, 489, & 743.

† See Abh. bayer Ak. Münch. v. p. 458.



MUSEUM
2300073



23.5
1872.

CAPRA PICTA ♀

SMITHSONIAN INSTITUTION
25058





CERVUS SAVANNARUM ♂

BRITISH
28OC73
MUSEUM



Head of *Saimaris usta*.

right to record my testimony in favour of its distinctness. In general colour and shape it unquestionably closely resembles *S. sciurea*; but its naked ears (see figure) render it easily recognizable.

3. GALAGO GARNETTI, Ogilby.

Otolicnus garnetti, Ogilby, P. Z. S. 1838, p. 6.

Otolemur agisymbanus, Coquerel, Rev. et Mag. de Zool. 1859, p. 457.

Galago garnetti, Sclater, P. Z. S. 1864, p. 711, pl. xl.

On showing two examples of the Galago which we usually call *Galago garnetti*, living in the Gardens, to M. Alphonse Milne-Edwards, he immediately recognized them as the *Otolemur agisymbanus* of Coquerel; and upon reference to the description of that author there can be little doubt, I think, that these two names are synonymous.

The only certain locality for this Galago yet known is the island of Zanzibar, that of "Port Natal," hitherto given in the Catalogue of Vertebrates, resting on imperfect information.

4. CAPRA PICTA. (Plate LVIII.)

Ægocerus pictus, Erhardt, Fauna d. Cycladen, p. 29.

The female Ibex from Crete, presented by Mr. Sandwith on the 30th of September last, for which I was unable to find a name when I reported its arrival* seems to belong to the *Ægocerus pictus* of Erhardt's 'Fauna der Cycladen,' published at Leipsic in 1858. Dr. Erhard discovered this species in the island of Eremomelos or Antimelos, a little rocky island near Melos, in 1854, but says that, according to the reports of English Officers, it also occurs in Crete.

This species being so little known, I have had a drawing of the specimen made by Mr. Keulemans.

* See P. Z. S. 1871, p. 627.

5. CERVUS SAVANNARUM. (Plate LIX.)

Cervus savannarum, Cab. in Schomb. Guian. iii. p. 785.

For some years we have had in our Gardens representatives of two nearly allied species of American Deer belonging to the group of *Cervus virginianus*. One of these has always been called *Cervus mexicanus*; the other, which was left undetermined in the last edition of the 'Catalogue of Vertebrates' (p. 49), I have until recently termed *Cervus virginianus*. Lately, however, I have convinced myself that the latter species has been wrongly named, it being much smaller than the true *C. virginianus* of N. America, and of the same size as *C. mexicanus*, and after some investigation have come to the conclusion that it is *probably* referable to the southern form of *C. virginianus*, which Cabanis has named *Cervus savannarum*.

Our male of this Deer, received March 13, 1868, was in fine condition in the spring of this year; and I now exhibit a drawing of him (Plate LIX.) by Mr. Keulemans. In winter, when the horns are shed, this Deer is very similar to *Cervus mexicanus*; but in summer he is readily distinguishable by the fine red colour of his fur and the three forward snags on his horns, as in *C. virginianus*. *Cervus mexicanus*, so far as I know, never attains more than two forward snags.

On the 15th of February last we purchased a Deer which seems to be the female of this species; so that we now have a pair of them.

6. CRAX INCOMMODA, sp. nov.

I propose to give this designation in the new Catalogue of Vertebrates to a Curassow purchased of the Jardin d'Acclimatation of Paris on the 25th of May 1870. It is a female, but of a species unknown to me, and different, so far as I can make out, from any of those mentioned in the recently published "Synopsis of the *Cracidæ*" by Mr. Salvin and myself. It most nearly resembles the female of *Crax daubentoni* *, but is readily distinguishable by the narrow white transverse undulations of the upper plumage, and the pale flesh-coloured legs. The tail is tipped with white, as in *C. daubentoni*; and the bird is of about the same size.

I hope to be able to give a figure of this bird, and of the other species of true *Crax*, in a paper which I am preparing on the subject for the Society's 'Transactions.'

1. On the Bats of the North-western Himalayas. By Capt. THOMAS HUTTON. With Notes and Corrections in Nomenclature by Prof. W. PETERS, C.M.Z.S. (Communicated by Mr. F. MOORE†.)

[Received May 14, 1872.]

Of the Bats hitherto procured in the north-western hills, four or five appear to be identical with European forms. There are,

* See P. Z. S. 1870, p. 516.

† The specimens of Bats described in this paper were presented to the India Museum, London, in July 1871, and were, together with the Memoir, forwarded

however, still others which I have not yet been able to procure; but the species already in my possession amount to twenty-three in number, belonging to various genera.

During the broad light of day these animals frequent dark out-offices, lofts, holes in trees, wide caverns, narrow clefts in rocks and in buildings and old ruins generally; are to be found under the eaves of thatched houses, and in almost every hole between the masonry and roofing-timbers of verandahs. They are easily detected by the litter which is strewed beneath their retreats. Out of mere narrow cracks in rocks by the roadside they sometimes issue, in the early twilight, by dozens, following each other in an incessant stream for several minutes. These are the smaller *Rhinolophi*; and in such cases all are found to be of the same species; and I have never yet known more than one kind to inhabit any particular spot if at all straitened for room. Five or six individuals of *Nycticejus* may be poked out of one small hole in a verandah, but never intermingled with any other species than their own. This, however, applies only to such narrow and confined places, where they would necessarily be brought into close proximity; for in a large out-office, loft, or spacious cavern, where they can hang apart, several distinct species may occasionally be found. Confined in a box or basket, even for a few hours, I have found that *Vespertilio blythii* and some of the *Nycticeji* will prey upon each other; and this propensity may probably account for the fact of the different species when at large invariably keeping apart from each other.

The first species to be described is an old friend which occurs generally throughout India, clustering together in large trees during the day, and sallying forth in the evening; this is the well-known "*Flying Fox*" of Europeans in India, and is of large size.

Genus Pteropus.

Characters.—Head elongated, conical; muzzle tapering, fine; nostrils slightly produced; tragus none; tail short or wanting; ears lateral, ovate, elongate; wings ample; a sharp, falcate, and triangular claw at the end of the first joint of the outer finger, the point turned upwards towards the thumb; interfemoral membrane short. Frugivorous.

1. Pteropus edwardsi.

Pteropus medius, Temm.; Sykes, P. Z. S. 1830–1, p. 99.
Pteropus leucocephalus, Hodgson.
Pteropus assamensis, M'Clelland, P. Z. S.
Pteropus edwardsii, Temm.; Geoff.; Horsf.; Blyth.
"*The Flying Fox*," or "*Fox-bat*," of the Plains of India.

At Neemuch, in Western India, this species was exceedingly abundant, hanging during the daytime, in parties of six to a dozen or more, in the large mango-trees, issuing forth about dusk in

to Prof. Peters, of Berlin, who has very kindly examined them, and made what corrections were necessary in the identification of the species.—F. M.

search of food. Notwithstanding their strong disagreeable odour and forbidding appearance, the Kanjars, or gipsies, residing in the neighbourhood used to catch and eat them when other food was scarce or dear. Colonel Sykes mentions the occurrence of this animal in the Mahratta country, where it is called *Warbagool*, and is eaten by the lower class of native Portuguese; he testifies also to the savouriness of the flesh, having tasted it himself.

Mr. Hodgson, writing from Nipal, says of this species that "the whole head and neck, with the body below, is rufous yellow; face as far as the eyes, the body above, and the membranes deep brown; snout to rump 10 in.; expanse 46 in.; weight 22 oz." I have myself seen similarly coloured specimens at Neemuch; but why Mr. Hodgson under these circumstances should have given it the specific name of "*leucocephalus*," or white-headed, it is somewhat difficult to imagine. It is said to visit Nipal only during the autumn season, while the pears and guavas are ripening; and the same is the case in the Dehra Doon below Mussooree, where nightly visits are paid to the fruit-gardens from the middle of August to the end of September. It does not pass the day in the Doon; upon this point both natives and Europeans are agreed: and consequently each night during our fruit-season the animal in coming and going must perform a journey of from twenty-five to thirty miles at the least. A female shot at Dehra on the 20th of August, and very obligingly sent to me, presented the following characters and appearance:—

Expanse of wings 3 ft. $9\frac{1}{2}$ in.; length from nose to the outer edge of the interfemoral membrane 1 ft. $\frac{1}{4}$ in.; length from the nose to between the heads of the thigh-bones, $11\frac{1}{4}$ in.; ear, from base to tip, $1\frac{1}{2}$ in., pointed; carpus $6\frac{3}{4}$ in.; tibia $3\frac{1}{4}$ in.; nostrils divergent, separated by a notch or groove; muzzle, ears, membranes, toes, feet, and claws intensely black; the back from the shoulders clothed with soft silky fur, also intensely black, but with here and there a scattered white hair; head brown-black or blackish brown; a rufous collar round the neck, brighter on the dorsal or upper aspect, browner below: body beneath rufous brown; wings bearing woolly rufous brown hairs on the underside, between the humerus and carpus, and the same down the edge of the carpal bone to the end of the body; interfemoral membrane emarginated by the want of a tail; heel-bone $\frac{3}{4}$ in., keeping the membrane expanded; wing attached to the two outer toes between the first and second joints; foot in the interfemoral to the ankle; greatest breadth of wing at the middle $9\frac{1}{4}$ in.; longest finger 1 ft. $\frac{1}{2}$ in.; a short, broad, somewhat triangular and sharp-pointed claw curving upwards at the end of the index finger. This claw appears to be for the purpose of grasping fruit between itself and the thumb while the animal hangs suspended by the feet.

Dr. M'Clelland's description of his *Pteropus assamensis* clearly shows it to be of this species; there is in fact an almost endless variety of colouring. The Assam specimen appears to have been passing from the stage in which the above female is described into that of Mr. Hodgson's Nipal specimen.

The males are exceedingly filthy in their habits, voiding their water over the body and head, and even imbibing a small quantity; hence the unpleasant odour.

Mr. Blyth gives as the habitat:—"India generally; Ceylon, Maldives, Assam, Sylhet, Arracan, Pegu, Tenasserim, and Malayan Peninsula (?)," to which may be added the Mahratta country, Western and Northern India, thus exhibiting a very wide geographical range.

Genus CYNOPTERUS.

Characters.—Head short and broad; lips thick on the sides; tail short, nearly free; frugivorous.

2. CYNOPTERUS MARGINATUS.

Vespertilio marginatus, B. Hamilton.
Pteropus et Pachysoma titthæcheilus, Temm.
Pachysoma brevicaudata, P. diardii et duvaucellii, F. Cuvier.
Pteropus pyrivorus, Hodgson.
Pteropus dussumieri (?), Royle's Catalogue.
Cynopterus horsfieldii, C. affinis, Gray.

Native name "*Chám gidili*," or "*Chám gidar*," "*Evening Jackal*."

Hab. India generally; Burmese and Malay countries; Calcutta and Nipal in the autumn months, to plunder the gardens of the ripening fruits.

Mr. Hodgson describes this species as being "wholly of an earthy brown; nude skin of lips, of joints, and of toes fleshy grey; tail very short, with its base enveloped in the interfemoral membrane, and its tip free. Snout to rump 6 inches; tail half an inch; expanse 2 feet; weight 5 oz."

In Nipal this Bat is a perfect pest, from the havoc it makes among the ripe pears and guavas. Mr. Hodgson says they are only seen in Nipal about midnight, when they come to feed from very considerable distances. "In the plains it is noted of them that they will travel from thirty to forty miles, and as many back, in the course of a single night, in order to procure food."

Although this statement seems almost incredible, yet it is nevertheless quite true; and when the insatiable voracity of the animal is taken into consideration, I can well imagine its often being compelled to travel for long distances in search of food. One that Mr. Blyth presented to me in Calcutta in 1849 appeared to be almost incessantly eating, resting only, even during the day, for a short interval of sleep, and then recommencing upon ripe guavas as if it had not seen food for a fortnight.

Although I have never yet been able to procure a specimen from Dehra, yet the gardeners assert that it is to be found there late at night during the fruit-season along with the preceding species, and that both leave the Doon before the morning. The most curious part of the proceeding consists in the animal's discovery of fruit in the valleys of Nipal and Dehra! Range over the gardens of the

Plains they both may well do; but to reach Dehra they must either cross the Siwalik range of hills, from 3000 to 3500 feet high, or thread their way for miles through the passes leading into the Doon, though even then we may ask with amazement how, when they are approaching the Siwaliks, they can tell that there is fruit some twenty miles in advance of them! To reach the valley of Nipal at 6000 feet of elevation they must ascend and descend the mountains; and, wonderful yet to say, they penetrate no further into the hills, neither do they ascend from the Doon to Mussooree, apparently instinctively knowing that they will find no guavas further in the hills! Almost equally astonishing is it that having thus feasted in the Doon and in Nipal they should be able to find their way back again through forests and hills for thirty or forty miles to their natural haunts in the plains.

Genus RHINOLOPHUS.

Characters.—Muzzle above furnished with a complicated series of membranes, forming a facial crest, in which the nostrils are situated; interfemoral membranes of moderate size, enveloping the tail; ears large, lateral, erect; the facial crest on the muzzle in the form of a horseshoe; a central raised process and a somewhat lanceolate narrow crest behind all.

3. RHINOLOPHUS LUCTUS.

Rhinolophus perniger, Hodgson, J. A. S. B. xii. 414; xiii. 484; Blyth, Cat. Mam. Mus. A. S. B.

Rhinolophus luctus, Temminck.

Hab. Lower regions of the hills; also Dehra Doon and other parts of India; Nipal, &c.

This is a large species, occurring plentifully in Mussooree and Dehra. Mr. Hodgson mentions that in Nipal it is restricted to the forests, shunning the habitations of man. This, however, in the north-western hills is certainly not the case, as I have taken it at 5500 feet, while hanging from the roof of an outhouse in which rabbits and firewood were kept, looking, with its ample black wings folded round it as a cloak, somewhat like a large black cocoon. The fact is that these larger-sized Bats could not pursue their flight in the thick forests away from the habitations of men; they require room, and find their prey in the open forests or forest glades, or over the cultivated fields and gardens; and even where man does not dwell, there are always plenty of open spaces even in forest tracts where they can wheel around the trees, and seize the beetles that are humming round them or feeding on the leaves.

Mr. Blyth seems inclined to separate this species from Mr. Hodgson's *Rhinolophus perniger*, because, as he says, the facial membranes which form the nose-crest are less complicated in the latter than in the *R. luctus* of Temminck; but these membranes

in all my specimens are precisely similar to those sketched by Cassell as pertaining to *R. luctus*; and they are in no degree more complicated than those of any other species of the genus. In dried skins, no doubt, they appear to be complicated enough; and it is often impossible to say what they may have been like in the living subject; but as I invariably work with living or freshly killed specimens, I find no difficulty at all. Of *R. luctus*, Gray says, "Black, with a slight ashy tinge;" and of *R. perniger*, Hodgson observes, "Fur longish, very soft, lax, and slightly curled; colour uniform black, embrowned on the nude cutaneous parts, slightly tipped with silver on the back." Temminck's *R. luctus* is "black, tipped hoary on the back;" and precisely so are all the specimens, some fifty in number, that I have procured at Mussooree and in the Dehra Doon. All things considered, then, there does not appear to be a shade of difference between the two; and consequently I retain the name bestowed upon it by Temminck, the inapplicability of Mr. Hodgson's name being shown in the fact that the animal is "*tipped with silver* on the back," with "nude cutaneous parts *embrowned*!" To its being *black throughout*, as the name *perniger* implies, this is somewhat of a contradiction!

This fine species commences its flight rather early in the evening, and does not soar high, like the smaller bats in general, but remains below at about twenty to thirty feet from the ground, wheeling with a somewhat heavy and noiseless flight around buildings and large trees in search of small beetles and other insects. Indeed I think it may be truly said of all the larger species of Bats that they hawk for prey in the lower regions of the atmosphere, while nearly all the smaller ones ascend; and the reason is, that while the flies and minute insects are in the higher regions, the large beetles and other large insects, of which the smaller Bats could make no use, are found below among the branches of the trees.

This species appears usually to dwell in pairs, and does not associate in communities like some of the smaller Rhinolophi—though in a large cavern, affording ample room for them to hang apart, several pairs may sometimes be found. I have taken them from the roofs of outhouses, and in wide caves in limestone rocks; but they appear to fly only during the warmer months of summer, remaining (at least such is the case at Mussooree) in a semitorpid state during the winter. It is possible, however, that in the warmer south-eastern climates of Sikkim and the Cossiah hills they may be active likewise in the winter.

The animal is black all over, membranes and all, with a sprinkling of hoary ash on the back; when any parts are embrowned it is owing to the dryness of the dead specimen, and is not natural to the living animal.

♂. Carpus 3 inches; expanse of wings 18½ in.; ears 1½ in. Fur long, soft, dense, and slightly frizzled or curly. Facial crest well developed and of the ordinary type. This was a male; but a female taken in June at Dehra agrees more nearly with Mr. Hodgson's description, which was likewise taken from a female. Carpus

$2\frac{1}{2}$ in.; tibia $1\frac{1}{2}$ in.; tail 2 in.; body, from nose to insertion of tail, 4 in.; total length 6 in.; ear $1\frac{1}{2}$ in.; expanse of wings $17\frac{1}{2}$ inches. The colour as in the male.

Mr. Hodgson gives for a female:—"Snout to rump $3\frac{1}{2}$ in.; tail $2\frac{1}{8}$ in.; total $5\frac{5}{8}$ in.; expanse 17 in.; ears from anteal base $1\frac{1}{16}$ in.; forearm $2\frac{5}{8}$ in." If we suppose that these measurements, as doubtless they were, were taken from a dried skin, we shall find but little difference between them and those I have given above.

The dimensions of another male, taken in a cave at Mussooree in August, were:—carpus $2\frac{3}{4}$ in.; tibia $1\frac{1}{2}$ in.; nose to tail $4\frac{1}{4}$ in.; tail $1\frac{1}{16}$ in.: length $6\frac{3}{16}$ in.; expanse $17\frac{1}{8}$ in.; ear $1\frac{1}{9}$ in.

A female taken with it measured:—carpus 3 in.; tibia $1\frac{1}{2}$ in.; nose to tail $4\frac{1}{16}$ in.; tail $1\frac{5}{16}$ in.; length $6\frac{9}{16}$ in.; ear $1\frac{1}{9}$ in.; longest finger $4\frac{1}{2}$ in.; expanse $18\frac{1}{2}$ in.; foot in the interfemoral to the ankle, in the wing to base of toes; 2 pectoral mammæ, 2 pubic false teats; ear pointed, transversely ribbed with wrinkles; antehelix rounded. The colours in all were the same.

As regards the measurements of all Bats, it must be evident that much will depend upon age, and that this is not sufficiently attended to—besides, that there will almost always be a considerable difference between a recent specimen and a dried skin. As to the facial membranes, if the animal is preserved bodily in spirits of wine, which is the method I pursue, they will remain expanded as in life; but in a dried skin they will shrink, shrivel, and curl up to a degree that would render it next to impossible to determine what they may have been like.

4. Rhinolophus affinis.

Rhinolophus affinis, Horsfield, Zool. Res. in Java, pl. 8. f. A, B; Temm. Monogr. ii. p. 35.

This Bat is by no means an uncommon species at Mussooree, in the north-west, at an elevation of about 5000 to 6000 feet. A fine male captured at about 6000 feet had the carpus $2\frac{1}{16}$ in.; tibia $1\frac{1}{16}$ in.; ear $1\frac{5}{16}$ in.; from nose to insertion of tail $3\frac{1}{2}$ in.; tail from vent $1\frac{3}{16}$ in.; total length $4\frac{11}{16}$ in.; expanse of wings 11 in.; longest finger 3 in.; interfemoral membrane somewhat straight, as if truncated, owing to the shortness of the tail.

Colour above dark brown with a tinge of chestnut; underside dusky brown with the same chestnut tinge, but somewhat fainter; fur long and dense, very soft, and on the underparts sparingly tipped with hoary; antihelix prominent, and divided from the outer lobe of the ear by a deep notch; somewhat ovato-quadrate in shape; ears subfalcate near the tips—which is indeed apparently more or less characteristic of the genus: facial crests as usual, the lanceolate summit somewhat broader and less acute than in other species; mouth large, face conspicuously broad and bluff, subquadrate and heavy-looking; aspect fierce; membranes dusky black.

Like the preceding, this species too is early on the wing, and may be seen in the evening twilight coursing slowly round the trees in

search of insects, crunching the hard-winged beetles as it flies, with a sharp crackling sound. It often flies so low as to be easily caught in a common butterfly-net. It does not appear to be so abundant as some other kinds, and does not ascend so high as Mussooree, but in the summer rainy season is found at from 5000 to 6000 feet elevation.

5. RHINOLOPHUS ROUXII, Temm.

Rhinolophus rouxii, Temminck, Monogr. ii. p. 306.

This species was taken by me at Mussooree and in the Dehra Doon.

At Mussooree, even at an elevation of 7000 feet, it makes its appearance so early as March, remaining inactive during the winter, but in the summer months coming forth from its retreat during the very earliest hours of twilight, when it may be easily captured in a butterfly-net while skimming over the surface of a pond or tank, or wheeling rapidly, with somewhat devious flight, around the mountain-oaks (*Quercus incana*) in search of prey.

The colour of recent specimens is a rather light brown, in some rather darker on the lower part of the back, beneath somewhat paler; fur soft, dense, and moderately long; membranes dusky black; expanse of wings 12½ in.; carpus 2⅛ in.; tibia 1¼ in.; ear 1 1/16 in.; from nose to insertion of tail 3 in.; tail 1¼ in.; total length of female 3 1/16 in. The interfemoral membrane, as will be seen by the shortness of the tail, is short, narrow, and straightened, tending towards emargination about the end of the tail; hairy to some little distance below the vent; the foot is in the wing to about 3/16 in. *above the ankle*, and in the interfemoral to the ankle.

Another female had the carpus 2 in.; tibia 1¼ in.; ear 1 1/16 in.; nose to tail 2 3/16 in.; tail 1¼ in.; total length 3 1/16 in. The length of the foot and claws from the heel is ½ inch; a tinge of maroon in the fur of the back. The females have 2 pectoral mammæ and 2 false pubic teats. The measurements of another specimen, taken in September at about 5400 feet, where it flew into the lights, were:—expanse of wings 13 in.; carpus 2⅛ in.; tibia 1¼ in.; ear 1 1/16 in.; nose to tail 3⅛ in.; tail 1¼ in.; total 4 in.; long finger 3⅛ in.; heel bone ½ in.

A specimen of this species sent to Calcutta for inspection was returned labelled "*Rhinolophus tragatus*," which, if Messrs. Hodgson and Blyth's measurements are to be depended upon, it cannot be. Neither of them notices the narrowness and semiemargination of the interfemoral membrane, which constitutes so strongly marked a feature in the species; and, indeed, Mr. Hodgson at once does away with such character by declaring the tail to be 1⅞ in., or 1 inch in excess of mine!

Mr. Hodgson gives to his Nipal "*tragatus*," "length 2⅝ in., and tail 1⅞ in.; expanse 15½ in.;" which would give the total length as 4½ in. Blyth gives the carpus as "2¼ in., and tibia 1 1/16 in.;" besides that, he says of the posteal nose-crest, "inconspicuous, being nearly concealed by the fur of the forehead."

The facial crest in *Rhinolophus rouxii* is much as usual in this genus, having the ordinary horseshoe-shaped membrane well defined upon the upper surface of the muzzle, in the area of which are the nostrils opening upwards; immediately behind the nostrils rises a central crest like a Roman nose, or, as Mr. Hodgson calls it, when describing *Rhinolophus tragatus*, "like a raised door-knocker!" The lower or anterior side of this is flat; behind this the crest extends backwards and upwards to the forehead, having two transverse folds or leaflets surmounted by a well-defined and prominent arrow-shaped membrane reaching beyond the base of the ears and in the middle of the forehead. There are three perpendicular or vertical grooves on the front of the lower lip or chin; but these, as well as the "door-knocker"-like process, appear to be characteristic of all the species. It is, however, almost impossible to convey an intelligible idea of these membranes to one who is not well acquainted with such animals.

6. Rhinolophus ferrum-equinum.

Rhinolophus ferrum-equinum, Schreber, t. 62.

This Bat is not uncommon in the Dehra Doon and as high as 6500 feet at Mussooree.

This species bears a very strong resemblance to the foregoing, but it is at the same time possessed of characters which fully entitle it to rank as a distinct species.

The colour of hill specimens is a light brown, rather darker on the lower part of the back; beneath the same shade, with the central line of the belly and throat a slight degree paler than on each side of it; membranes dusky black; fur long, dense, and soft. In the female the carpus is $2\frac{1}{4}$ in.; tibia 1 in.; ear $\frac{13}{16}$ in.; nose to tail $3\frac{1}{8}$ in.; tail $1\frac{5}{16}$ in.; total $4\frac{7}{16}$ in.; expanse of wings 14 in.; long finger $3\frac{7}{8}$ in.; interfemoral membrane neither truncated nor emarginate, but rounded out in consequence of the greater length of the tail; heel-spur $\frac{5}{8}$ in.; feet sparingly clothed with fine hairs; 2 pectoral mammæ, and 2 false pubic teats.

A male had carpus $2\frac{1}{4}$ in.; tibia $\frac{15}{16}$ in.; ear $\frac{14}{16}$ in.; nose to tail $3\frac{1}{8}$ in.; tail $1\frac{5}{16}$ in., tip exserted; colour brown. Another male, taken in October, had the carpus $2\frac{1}{4}$ in.; tibia $\frac{15}{16}$ in.; ear $\frac{15}{16}$ in.; nose to tail $3\frac{1}{2}$ in.; tail $1\frac{1}{2}$ in.; total 5 in.: expanse 14 in.; long finger $3\frac{6}{8}$ in.; of a beautifully soft pale mouse-brown above, somewhat paler beneath.

This species is readily distinguishable from the preceding by its somewhat superior size, and by the shape of the interfemoral membrane and longer tail.

7. Rhinolophus minor.

Rhinolophus minor, Horsfield, Zool. Res. in Java, pl. 8. f. C, D.

Hab. Mussooree, in clefts of rocks and in caves, at from 4000 to 6500 feet of elevation.

In this animal, which I obtained some years ago at Mussooree,

where it is very common, the colour is brown, with a slight tinge of fulvous in some specimens, somewhat paler beneath; membranes dusky black. Male, carpus $1\frac{14}{16}$ in.; tibia $\frac{12}{16}$ in.; ear $\frac{10}{16}$ in.; nose to tail, in some 3 in., in others $3\frac{1}{4}$ in.; tail from $\frac{14}{16}$ in. to 1 in.; total from $3\frac{14}{16}$ in. to $4\frac{1}{4}$ in. in others.

Foot in both membranes to the ankles; in some the extreme tip of the tail is exserted, in others only to the edge of the membrane; interfemoral membrane straight and narrow; longest finger $2\frac{3}{4}$ inches. The female has 2 pectoral and 2 false pubic mammæ. One female had the carpus 2 inches. These are the measurements of seven specimens, males and females. Ears acuminated, erect, semifalcate, with outer lobe rounded, and divided from the interhelix as usual by a notch.

This Bat is on the wing from early in the spring to the end of autumn. I discovered it, when taking an evening walk, coming out by dozens from a narrow crack in a rock by the roadside on the hill called at Mussooree the "Camel's Back," and while it was yet quite light in the early evening. At a lower elevation I afterwards observed that when the damp mists during the rainy season were very thick, or the evening was dull and lowering, these Bats kept within their cave and did not come forth at all, being thus sometimes imprisoned for two or three nights together.

The facial crest is as usual in the genus; but the posterior vertical leaflet is exceedingly small as compared with that of the foregoing species, being a mere narrow perpendicular stile crossed by a narrow transverse bar sloping downwards.

8. Rhinolophus macrotis.

Rhinolophus macrotis, Hodgson, J. A. S. B. xiii. 485; Blyth, Cat. Mus. A. S. B.

Hab. Nipal and Mussooree.

This is a small species, with, as the name indicates, rather unusually large ears for the size of the animal. The facial crest much as usual; but the central raised process is very much broader in proportion than usual, and the posterior perpendicular membrane is broad and somewhat elliptical in form.

Carpus $1\frac{11}{16}$ in; tibia $\frac{12}{16}$ in.; ear 1 in.; nose to tail $2\frac{1}{2}$ in.; tail $\frac{14}{16}$ in.; total length $3\frac{6}{16}$ in.; expanse 9 in.; longest finger $2\frac{3}{8}$ in.; tip of tail exserted. Colour brown, somewhat paler beneath; membranes and ears dusky black; interfemoral membrane straight and narrow; feet in both membranes to the ankle.

Another, which flew to the light in a room about 8 o'clock in September, at 5530 feet, had the carpus $1\frac{11}{16}$ in.; tibia $\frac{11}{16}$ in.; ear 1 in.; nose to tail $2\frac{6}{16}$ in.; tail 3 in.; point of tail not exserted (or perhaps broken off); interfemoral straight; feet in both membranes to the ankle.

They come out of caves in the earlier twilight hours, and may be seen flitting rapidly at some height in the air, chasing the small flies and beetles which abound during the rainy season. The above measurements are taken from recent specimens; and although they

do not quite tally with those given by Messrs. Hodgson and Blyth, the species is undoubtedly correctly identified.

9. RHINOLOPHUS PETERSI.

Rhinolophus petersi, Dobson, Journ. As. Soc. Bengal, 1871.

This is a still smaller species than the last, and is found at Mussooree at an elevation of about 5503 feet, and also in the Dehra Doon.

Colour brown; membranes dusky black; carpus of male $1\frac{7}{16}$ in.; tibia $\frac{9}{16}$ in.; ear $\frac{9}{16}$ in.; nose to tail $2\frac{1}{4}$ in.; tail $1\frac{2}{16}$ in.; total length 3 in.; foot in both membranes to the ankle; extreme tip of tail exserted; interfemoral short and straight.

Another male differed much in having the colours light greyish mouse-colour, rather lighter beneath. Carpus $1\frac{6}{16}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{10}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $\frac{9}{16}$ in.; total $2\frac{1}{16}$ in.; long finger rather more than 2 in.; tip of tail exserted; interfemoral narrow and straight; vertical posterior nose-leaf narrow.

It cannot be called a common species in the hills, and is found only in the warm summer months. It flies high and rapidly like the last, often coursing backwards and forwards over the same space for many minutes. One, however, proved an exception to this rule, being taken on the evening of the 23rd of August in mistake for a large Hawkmoth while skimming over a bed of flowers.

A male that was captured in a net while issuing from a cave on the 23rd August differed somewhat from the above, especially in expanse of wings, which was only $7\frac{13}{16}$ in.; carpus $1\frac{6}{16}$ in.; tibia $\frac{10}{16}$ in.; ear $\frac{10}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $\frac{13}{16}$ in.; total $2\frac{15}{16}$ in. Colour pale mouse-grey about the nape and upper part of the shoulders; hair brown on the back, beneath slightly hoary; feet in the membranes to the ankles; tip of the tail exserted. On the whole I am not satisfied that this last-mentioned individual is of the same species.

10. PHYLLORHINA ARMIGER.

Rhinolophus armiger, Hodgson, J. A. S. iv. 699.
Hipposideros armiger, Blyth, Cat. Mam. Mus. A. S. B.
Hab. The lower Himalayas from Simla to Darjiling.

This is a large species, and by no means uncommon at Mussooree. The colour above is sooty brown, beneath smoke grey, lightest at the vent; membranes sooty black; fur soft, dense, and short; expanse of wings $21\frac{1}{2}$ in.; humerus 2 in.; carpus $3\frac{3}{8}$ in.; tibia $1\frac{5}{8}$ in.; from nose to tail $5\frac{1}{4}$ in.; tail $2\frac{1}{4}$ in.; total $7\frac{1}{2}$ in.; ear $1\frac{3}{8}$ in., its inner edge with a thick band of hair; head large, bluff, and full about the face; ears pointed and transversely wrinkled, having at the outer margin two strong longitudinal ribs; foot large, in the wing and interfemoral membrane to the ankle.

The specific name was derived from a fancied resemblance between the facial crest and an escutcheon or coat-of-arms.

One specimen was captured at an elevation of 5500 feet, having

been attracted one evening in April to the lights in a room; and a pair were also taken in a loft at 6000 feet in September. From this loft, the trap-door being left open, they used to issue every evening about dusk, flying with a slow deliberate flight around the house, and never departing to any great distance. They hawked about only for a short time at intervals, retiring every now and then to the loft.

When captured alive, the large ears are kept in a constant state of rapid tremulous motion, and the animal emits a low purring sound, which becomes a sharp squeak when alarmed or irritated. The feet are large, and furnished with long powerful claws of a pale hue. When suspended at rest, the tail and interfemoral membrane are turned up, not in front, like the *Rhinolophi*, but behind over the lower part of the back; neither does it appear to envelope itself in its wings so completely as does *Rh. luctus*.

I have observed in this, and in all the above-noticed *Rhinolophi*, that when disturbed the whole of the facial crests are kept in a state of constant agitation; and as the animal hangs suspended by the feet the head and muzzle are stretched forth and turned about in every direction, as if for the purpose of sniffing out the presence of danger, and ascertaining the cause of the disturbance.

Coming out of its retreat before dark, and often, indeed, about or just before sunset during the cloudy and thick misty weather of the rainy season, it may frequently be seen leisurely wheeling with noiseless, cautious, and slow steady flight around some wide-spreading oak, attracted to the spot by the loud discordant note of a large *Cicada*, or tree-cricket, which is abundant at that season in forest-tracts above 5000 feet, and only pours forth its clamorous evening-song just as the sun begins to dip below the horizon, continuing its deafening and unmusical scream for about a quarter of an hour after sunset, when it suddenly ceases altogether.

It is during this dreadfully harsh concert, when almost every tree sends forth its stunning notes, that this Bat emerges from its hiding-place, wheeling round and round the trees, scanning each branch as he slowly passes by, now rising to a higher circle, and then perchance descending to the lower branches, until at length, detecting the unfortunate minstrel all unconscious of its danger and drowned in its own melody, it darts suddenly into the tree, and snatching the still screaming insect from its perch, bears it away, still harping upon one string, and jerking out an occasional wailing note as the relentless Bat deliberately devours it on the wing. Should the swoop into the tree be fruitless, the *Cicada* instantly darts forth to seek the shelter of another tree, the Bat following its victim with a slow and steady flight, which seems to say "I'll have you yet," and then wheeling about the tree as before, but at an increased distance, patiently awaits the renewal of the song, which he no sooner hears than he summarily puts a stop to the ear-splitting clamorous note by effecting a seizure and bearing off his prey in triumph.

Like *Rh. affinis*, this species may also frequently be heard during its flight cracking and crunching the hard wings of Beetles, which in the

evening hours are usually abundant among the trees. The teeth are strong, and the *tout-ensemble* of its aspect is not unlike that of a Bulldog.

A female taken from a cave in August measured :—carpus $3\frac{3}{4}$ in.; tibia $1\frac{10}{16}$ in.; ear $1\frac{1}{2}$ in.; nose to tail $5\frac{6}{16}$ in.; tail $2\frac{1}{4}$ in.; expanse 20 in. Foot in both the membranes to the ankle; tip of tail exserted; membranes intensely black; longest finger 5 in.; fur a soft brown, with ashy tips.

Mr. Blyth tells us that this species is very closely allied to, if not identical with, *Hipposideros nobilis* of Horsfield. I doubt its identity with the Javan species. The colours he gives as "uniform light brown, with dark maroon tips to the fur of the upper parts. Length of forearm (of a large specimen) $3\frac{5}{8}$ in., and of tibia $1\frac{1}{2}$ in." This, however, is not a large specimen, but one of ordinary size.

11. PHYLLORHINA BICOLOR.

Rh. bicolor, Temm. Monogr. ii. p. 18, t. 32, f. 9, 10.

In a recent specimen the colour was uniform mouse-brown on the back, pale ashy beneath; membranes dusky; carpus $1\frac{5}{8}$ in.; tibia $\frac{11}{16}$ in.; ear 1 in.; transverse breadth $\frac{5}{8}$ in.; nose to tail $2\frac{3}{8}$ in.; tail $1\frac{1}{4}$ in.; total length $3\frac{1}{2}$ in.; antehelix small. The facial crest consists of the horseshoe-shaped membrane on the muzzle, in the area of which are the nostrils in the form of a short longitudinal slit, and divided from each other by a slightly raised ridge. Behind the horse-shoe rises a thick transverse membrane, divided into three lobes or knobs; and again immediately behind this is another raised tranverse canopy-like membrane, the anterior edge of which bends slightly forward. This is divided into four small chambers by three narrow septa. The whole is quadrate, and occupies the entire space between the eyes and the end of the muzzle.

My specimens were captured at an elevation of 5500 feet; but the species, although occurring both on the hills and in the Dehra Doon, does not appear to be at all common. The ears are closely and finely ribbed transversely with a fringe of fine cilia along the inner border of the anterior margin; semiemarginate near the summit on the external border, from which to the base it is strongly curved outwards. Feet free to the ankles; tip of tail in the membrane, and not exserted.

Mr. Blyth has mentioned having received from the Dehra Doon a small species, which he doubtfully refers to *Hipposideros speoris*, although at the same time he admits the possibility of its proving distinct. The dimensions given by him, however, of *H. speoris* far exceed those of either of my smaller species, and prove it to be distinct from both—besides that in mine there are no lateral fringes below the eye on the muzzle, which at once decides the question. Mr. Blyth says of *H. speoris*:—"Colour nearly as in *H. armiger*; length of carpus 2 in.; tibia 1 in." Mr. Walter Elliot, of Madras, says:—"Carpus 2 in.; tibia $\frac{9}{10}$ in.; ear $\frac{6}{10}$ in.; expanse $12\frac{1}{2}$ to 13 in.; nose to tail $2\frac{3}{10}$ in. or female $2\frac{2}{10}$ in.; tail 1 in.; total length $3\frac{3}{10}$ in."

In this, then, the carpus is nearly half an inch longer; and it has

three lateral fringes in front of the eye, which are wanting in my specimens.

12. PHYLLORHINA MICROPUS, Hutton, n. sp.

If the last-mentioned species is distinguished from *H. speoris* on account of the difference in size and absence of lip-fringes, still more must the present form be distinct. It occurs in the summer months both in the lower hills and Dehra Doon. One was taken on a warm evening in September, having flown in to the lights in a room; and another was taken at the foot of the hills in the same way in October. It is by no means common.

A female has the carpus $1\frac{3}{8}$ in.; tibia $\frac{9}{16}$ in.; ear $\frac{11}{16}$ in.; nose to tail $2\frac{1}{8}$ in.; tail $1\frac{1}{16}$ in.; total $3\frac{11}{16}$ in.; expanse $9\frac{1}{8}$ in. Colour above soft hair-brown, beneath dull ashy; membranes and ears dusky black; feet small, free to the ankles; ears closely ribbed transversely, and with a fringe of fine hair inside the small obtuse antihelix; ears and feet conspicuously smaller than in the last. Facial crest smaller than in *Rhinolophus macrotis*; and the transverse rib behind the nostrils is not three-lobed, but has one thick knob in its centre projecting forwards. The extreme tip of the tail is exserted beyond the membrane; no lateral fringes on the upper lip.

Type in coll. India Museum, London.

Genus BARBASTELLUS.

Characters.—Ears large, broad, subquadrate, slightly emarginate near the tip, which is rounded; outer edge of the ear rounded, and coming well round to the front of the tragus; tragus subtriangular, the base broad and narrowing upwards to end in a rounded top; ears approximate over the forehead, touching at the base, but not joined; muzzle short, flat, and truncated, the end divided from the cheeks by a deep groove, ascending in front from the edge of the upper lip, and proceeding back on each side in a lunate form to the junction of the ears in front, forming a pit on the upper surface of the muzzle; nostrils placed *laterally* at the top of the muzzle, not above; tail long; forehead rising immediately behind the ears, and well covered with fur; muzzle seminude and gibbous; eyes placed at the base of the ear, in front of the tragus, and almost within the ear.

13. BARBASTELLUS COMMUNIS.

Vespertilio barbastellus, Schreber; Gmel.

Barbastellus communis, Gray, Ann. & Mag. Nat. Hist.; Blyth, Cat. Mam. Mus. A. S. B.

Hab. Europe and Subhimalayan regions at Mussooree.

I have taken this species as high as 6500 feet; but it appears to be far more numerous at the lower elevation of 5500 feet. Mr. Hodgson does not appear to have met with it in Nipal.

It is perfectly surprising to see into what very narrow holes and mere crevices these animals can squeeze themselves, and where, but for the litter below, they might remain undetected for ever.

The colour is a deep blackish brown, tipped with hoary; carpus $1\frac{11}{16}$ in.; tibia $1\frac{9}{16}$ in.; from nose to tail $2\frac{5}{8}$ in.; tail from vent $1\frac{7}{8}$ in.; total length $4\frac{1}{2}$ in.; ear $\frac{3}{4}$ in.; heel-bone $\frac{3}{4}$ in.; expanse of wings, 11 in. Tragus slightly bending outwards, half the length of the ear, subtriangular, base broad, narrowing upwards to the summit, which is rounded.

Fleming places this Bat in the genus *Plecotus*, on account of the approximation of the ears, which, he says, are "united at their inner edges above the eyes." The junction is merely at the base, on a line with the eyes, and is not an actual union, but simply a contact of the inner basal edges. In his measurement the expanse agrees with mine, but the length is half an inch less; this doubtless proceeds from his having had dried skins only.

This is a common species during the whole of the summer months; but as it is never seen in the winter, I conclude that it hibernates in its retreat. It comes forth rather late in the evening, and after the twilight has deepened into the first shades of night. They appear to be very inconstant visitors, as for two years they occupied a hole in the roof of an upper story, but made such a litter on the floor that it was determined to dislodge them. The first year they remained unmolested, but in the second year several of them were caught and preserved; in the third year not one was visible, nor did they return again. They were in dozens for those two years.

Mr. Blyth, in his 'Catalogue of Mammalia in the Museum of the Asiatic Society of Bengal,' falls into a curious error in regard to *Nyctophilus geoffroyi*, which he says he received from Captain F. Hutton, from Masuri, while yet he states the *genus* to be Australian. But I have no specimen by me, nor do I know that I ever saw one. In 1844, the year in which he says he received it, I was certainly the only Captain Hutton at Musooree, and my initial is not *F.*, but T. Another very frequent error of the same writer consists in his placing the Tyne range of hills to the north of Simla, instead of immediately at the back of Musooree, from which it is separated only by a broad, deep, trough-like valley.

If the species were really received from me, it must have been procured north of the Tyne range, and sent down to Calcutta mixed up with specimens of *Barbastellus communis*.

Genus Plecotus (Geoffr.).

Generic characters.—Ears very large, erect, and oblong ovate, united at the base over the forehead; incisors $\frac{4}{6}$, molars $\frac{5.5}{6.6}$.

14. Plecotus auritus. (The Long-eared Bat.)

Vespertilio minor, Brisson, Quad. 226.

Vesp. auritus, Linn. Syst. Nat.; Geoff. An. Mus.; Kuhl, Deutsch. Flederm.; Desmar, Mam.; Jenyns, Brit. Vert.

Plecotus auritus, Geoff.; Gray, Zool. Journ.; Flem. Brit. An.

L'Oreillard, Daub. Mém. Acad.; Buffon.

Long-eared Bat, Penn. Brit. Quad.

Length from the nose to insertion of tail $2\frac{1}{4}$ in.; tail $2\frac{1}{8}$ in.; total length $4\frac{3}{8}$ in.; ear $1\frac{1}{2}$ in.; tragus $\frac{5}{8}$ in.; carpus $1\frac{3}{4}$ in.; tibia $\frac{3}{4}$ in. The tip of the tail obtuse, and exserted beyond the edge of the membrane about $\frac{1}{8}$ in. Fur brownish-grey above, rather paler beneath. Female.

My specimen is a female, and was received from the central region of the hills through the kindness of Mr. F. Wilson, and, with the exception of some of the dimensions, as given by Bell in his 'British Quadrupeds,' is, I think, undistinguishable from the English species.

Bell's description, indeed, is precisely that which I should have given of the Himalayan specimen; for the trifling differences in the dimensions may be due to age, or sex, or even to the condition of the specimens when measured. Mine was preserved in spirits of wine, while probably Bell described from a dried skin, which would be quite sufficient to account for most of the differences. One thing he has omitted to mention, although he indicates it in the figure of the head at page 57—namely, that proceeding from the nostrils, and running back to the base of the muzzle, is a narrow open groove.

This little Bat, so remarkable for the great length of the ears in proportion to the size of the body and head, is found during the summer months far in the interior of the mountains in the northern portion of the central region. It does not occur at Mussooree, nor in the immediate neighbourhood.

Bell says of *P. auritus*:—"The inner margin of the ear is bent back from the middle cartilage, forming a broad longitudinal fold, which is ciliated at its edge, as well as along the carina formed by its duplicature" *.

In the 16th volume of the 'Journal of the Asiatic Society of Bengal' Mr. Hodgson has described a species under the name of *P. homochrous*, from the central region, but which Mr. Blyth has placed as a synonym of *P. auritus*, which I also should have been inclined to do, had not Mr. Hodgson distinctly stated that the "ears were disunited" at the base, in which case it can be neither *P. auritus* nor a true member of the genus. It is stated likewise that the ears are nude, as in mine, which possibly might have had some weight in identifying it with my species, but for the disunion of the ears. The same naturalist notices a species as *P. dargilingensis*, which Blyth, rightly or wrongly I know not, also doubles up with *P. auritus*. Hodgson assigns a different dentition from the *P. auritus*, making the molars $\frac{4.4}{5.5}$ instead of $\frac{5.5}{6.6}$, as Bell gives them; from which facts it is clear that Hodgson's Bat must belong to a different genus. *P. auritus* is found also in the Simla hills.

We now come to the genus *Scotophilus*, which, as at present defined by Mr. Gray, is altogether unsatisfactory. That gentleman says:—"I am inclined to confine the genus *Scotophilus* to those species which have the wings attached to the ankles as far as the base of the toes,—as *Scot. temminckii* and *Scot. fulvus* of Asia, which have

* This description applies equally well to my specimen also, in which the back of the ear is perfectly nude.

the interfemoral membrane smooth; as in *Scot. serotinus*, *Scot. discolor*, *Scot. leisleri*, and *Scot. murinus* of Europe, and *Scot. lobatus* of India, which have cross lines of hair on the underside of the interfemoral membrane." He thus merges *Nycticejus* in what he would make out to be *Scotophilus*, saying that the former is but an old, and the latter a young specimen of the same genus. In this case, however, on the principle of "*seniores priores*," the adult ought to stand as the type of the genus, and not the immature one; and hence I have adopted *Nycticejus*, of Rafinesque, in preference to *Scotophilus*, of Leach, the more especially as Mr. Gray's own definition of the latter excludes the species he cites as belonging to it; for when he says "I am inclined to confine this genus to the species which have the wings attached to the ankle *as far as the* base of the toes," and then cites *Scot. leisleri* as an example, we perceive at once the worthlessness of the genus, and of the definition also, inasmuch as the latter species has *the feet and ankles entirely free*, both the membranes being attached to the tibia *above the ankle**!

Genus Nycticejus.

Characters.—Face bluff and swollen on the sides; muzzle nearly nude in front; wings and ears thick, rather coriaceous; muzzle short; ears wide apart, at the sides of the head; inner margin of ear angular, the outer margin continued round almost to the gape or angle of the mouth; tragus falcate, tapering up to a point, half the length of the ear; head above broad and flattened; nostrils prominent at the end of the muzzle; feet in the wing to the base of the toe, in the interfemoral membrane to the ankle; eyes small and low down.

15. Nycticejus luteus.

Nyct. flaveolus, Blyth; Horsf. Cat. Mamm. Ind. Mus.
Scot. temminckii, Gray.
Nyct. luteus, Blyth, Cat. Mam. Mus. A. S. B.
Hab. Bengal, Sylhet, Assam, Burmah, Dehra Doon.

This species, as far as I have been able to ascertain, never ascends the hills of the north-west, although it is abundant at elevations of 2000 to 3000 feet, as at Rajpore, at the foot of the Mussooree range.

The colour of the animal when alive is a greenish olive-brown on the back; underparts silky yellow, often shining or glossy; membranes dusky black; carpus $2\frac{7}{16}$ in.; expanse $16\frac{1}{4}$ in.; greatest breadth of wing 3 in.; from nose to tail $4\frac{1}{4}$ in.; tail from vent $2\frac{1}{4}$ in.; total $6\frac{1}{2}$ in. Interfemoral membrane paler beneath than above; feet half free, being in the wing to the base of the outer toe, and in the interfemoral membrane to the ankle; membranes nude; ears $\frac{3}{4}$ in. apart, thus showing the great breadth of the head; length of head about 1 inch; face bluff; head thick-looking, flat-crowned, and large; muzzle nude; lips and cheeks tumid; the external mar-

* *Remark by Prof. Peters.*—Captain Hutton has determined erroneously *Miniopterus blepotis* as *Scot. leisleri*.

gin of the ear extending forwards to the gape; tragus obtusely pointed, falcate, and turning inwards; extreme tip of the tail exserted for one joint beyond the membrane; heel-bone reaching to about $\frac{2}{3}$ of the distance between the heel and the tail. In the male the colours are brighter than in the female.

In the daytime this Bat is found sometimes singly, sometimes in pairs, and again in small parties of five or six, hanging from the roofs of outhouses, sheds, verandahs, and large open halls and temples, coming out about dusk. Tongue closely studded with papillæ; fur short and close.

16. VESPERUGO LEISLERI.

Vesp. leisleri, Kuhl; Bell, Brit. Quadr. pp. 18, 20.

This bat is far from common at Mussooree, and appears to be confined to an elevation ranging from 4500 to 5500 feet, on the northern side of the Tyne range, immediately beyond Mussooree.

The outer margin of the ear is continued round, as in the former, down to the gape; and the head has the same bluff and tumid appearance; the ears also are wide apart and angular on the inner margin, and the top of the head is flattened; the tragus is rather short, and somewhat kidney-shaped, rounded at the summit and turning inwards; colour of the fur dark brown, with a chestnut tinge, beneath paler and somewhat greyish; the aspect is exceedingly surly in expression; feet in the wing to the base of the outer toes, in the interfemoral to the ankle; the muzzle is bare; the lips are tumid and warty; muzzle short, broad, thick; ears ovato-triangular.

The 'Naturalist's Library' errs in saying that the tragus is elongated. The length of the head and body is given as 2 inches 9 lines. Bell gives 2 inches 11 lines. Again, in the former the tail is 2 inches, and expanse from 12 to 14 inches; while Bell gives "tail 1 inch 8 lines; expanse 13 inches 8 lines, to 14 inches and upwards." An Himalayan specimen, a male, has the carpus $1\frac{11}{16}$ in.; tibia $\frac{10}{16}$ in.: ear $\frac{1}{2}$ in.; nose to tail $3\frac{1}{8}$ in.; tail $2\frac{1}{8}$ in.; total length $5\frac{1}{4}$ in.; tragus short, kidney-form, and rounded at top.

17. VESPERUGO IMBRICATUS.

Vesp. imbricatus, Horsf.: Temm. Monogr. ii. p. 216.

Hab. Mussooree.

This is a smaller species, and was taken at an elevation of about 6000 feet, generally from holes under the thatch of houses. The specific name is derived from a narrow gorget or collar, extending over the breast or lower part of the neck, from shoulder to shoulder.

One male had the carpus $1\frac{1}{4}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{6}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $1\frac{6}{16}$ in.; the generic characters like the two preceding.

Another male had the carpus $1\frac{1}{4}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{6}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $1\frac{6}{16}$ in.; total length $3\frac{1}{2}$ in. The measurements are thus the same in both.

Muzzle pale brown, flat above, rather hollow; from the forehead back to the rump dark brown; tragus nearly half the length of the ear, rather pointed and narrow, subfalcate, and turning inwards; longest finger about $2\frac{1}{4}$ inches.

18. VESPERUGO MICROPUS, Hutton, n. sp.

This is the smallest of the genus I have yet found at Mussooree. It is rather a common species, both at Mussooree and in the Dehra Doon. It lives in communities, in holes in walls, and caves, and under the eaves of houses.

A male from Dehra measured as follows:—Carpus $1\frac{3}{16}$ in.; tibia $\frac{7}{16}$ in.; ear $\frac{6}{16}$ in.; from nose to tail rather less than 2 in.; tail $1\frac{6}{16}$ in.; total rather less than $3\frac{6}{16}$ in. Above brown; beneath greyish-brown; foot in the wing to the toes, in the interfemoral to the ankle. Expanse 8 inches.

A younger male from Dehra measured:—carpus 1 in.; tibia $\frac{7}{16}$ in.; ear $\frac{6}{16}$ in.; nose to tail $1\frac{10}{16}$ in.; tail $1\frac{3}{16}$ in.; total length $2\frac{3}{16}$ in.

The measurements of three females were the same, except that there was a slight difference in the length of the body, some being $1\frac{3}{4}$ in., others nearly 2 in. long.

♂. Carpus $1\frac{3}{16}$ in.; tibia $\frac{7}{16}$ in.; ear $\frac{6}{16}$ in.; nose to tail $1\frac{3}{4}$ in. tail $1\frac{1}{2}$ in.; total $3\frac{1}{4}$ in.

♂. Carpus $1\frac{3}{16}$ in.; tibia $\frac{7}{16}$ in.; ear $\frac{6}{16}$ in.; nose to tail $1\frac{3}{4}$ in.; tail $1\frac{3}{8}$ in.; total $2\frac{15}{16}$ in.

♂. Carpus $1\frac{3}{16}$ in.; tibia $\frac{7}{16}$ in.; ear $\frac{6}{16}$ in.; nose to tail nearly 2 in.; tail $1\frac{6}{16}$ in.; total $3\frac{6}{16}$ in., nearly.

In all the muzzle is flat above; tragus scarcely half the length of the ear; feet very small, hence the specific name; thumb-claw short and feeble; outer margin of the ear coming round to the gape; brown above, greyish-brown beneath; the longest finger about $2\frac{1}{4}$ inches.

When touched, or suddenly disturbed during the day, it opens wide the mouth, without uttering any sound or making the least attempt to bite, and will thus keep it open for several minutes, as if overpowered by sleep, or too lazy to reshut it. It makes no attempt to escape.

From Delhi, where it is said to be very numerous in the Kootub Minar, I have received two females, which for the present I must refer to this species, with which they agree tolerably well in all the measurements, except in having the length of the body much greater, viz.:—carpus $1\frac{3}{16}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{5}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $1\frac{2}{16}$ in.; total length $3\frac{1}{4}$ in.; tip of tail free. Another had the carpus $1\frac{2}{16}$ in.; tibia $\frac{7}{16}$ in.; ear $\frac{5}{16}$ in.; nose to tail $2\frac{2}{16}$ in.; tail $1\frac{2}{16}$ in.; total length $3\frac{1}{4}$ in. The colour is the same, and feet in the wing to the base of the outer toe, in the interfemoral to the ankle; outer margin of the ear extending round to the gape; tragus short, narrow, subfalcate, and pointed; feet small.

[Type in India Museum, London.—F. M.]

19. MINIOPTERUS BLEPOTIS.

Vesp. blepotis, Temm. Monogr. ii. p. 212, t. 53. f. 1, 2.

This species occurs from 2000 feet to 7000 feet of elevation in the N.W. Himalaya. It is found more abundantly in the valleys north of the Tyne range, beyond Mussooree.

The head is round on the top, and well clothed with fur; muzzle short and clothed; ears short, quadrato-triangular, and placed low on the sides of the head, on a level with the gape, the outer margin extending forward nearly to the gape; tragus short, rounded above, scarcely $\frac{1}{3}$ the length of the ear; fur soft, close, dense, and with a velvety feel.

Colour above snuff-brown, greyish-brown beneath; membranes dusky black, as are the ears; carpus $1\frac{7}{8}$ in.; tibia $\frac{6}{8}$ in.; nose to tail 3 in.; tail $2\frac{1}{8}$ in.; total length $5\frac{1}{8}$ in.; expanse 13 in.; both membranes attached to the tibia, about a quarter of an inch above the ankle. A hairy band (whence the generic name) extends down the carpus beneath nearly to the wrist.

Another one from Dehra, a male, had the carpus 2 in.; tibia $\frac{12}{16}$ in.; ear $\frac{1}{4}$ in.; nose to tail $2\frac{12}{16}$ in.; tail $2\frac{1}{4}$ in.; total length 5 in. Colour brown, with chestnut tinge.

This species is found at Mussooree, in caves and caverns, and even crevices in rocks, and is occasionally attracted to the lamps in a room.

I have never yet met with a specimen of this Bat that was not infested with *ticks*!

20. VESPERTILIO BLYTHII, Tomes.

Vesp. blythii, Tomes, P. Z. S. 1857, p. 53.

Hab. North-western Himalaya.

This fine species, although apparently somewhat rare at Mussooree, is not uncommon in the valleys north of the Tyne range, being there found numerously in caves.

The carpus of a male was $2\frac{1}{4}$ in.; tibia 1 in.; ear $\frac{7}{8}$ in.; expanse of wings 14 in.; nose to tail $3\frac{1}{8}$ in.; tail $2\frac{1}{2}$ in.; total length $5\frac{5}{8}$ in.; longest finger 4 in.

A female had the carpus $2\frac{3}{8}$ in.; ear $\frac{6}{8}$ in.; nose to tail 3 in.; tail $2\frac{1}{2}$ in.; total length $5\frac{1}{2}$ in.; longest finger $3\frac{1}{4}$ in.; expanse 15 in.

Colour above pale brown, greyish brown beneath; ears and tragus long, the latter falcate, bending outwards; outer margin of the ear reaching forward to beneath the eye, and nearly halfway to the gape; tragus nearly half the length of the ear, narrowing upwards to an obtuse point; membranes dusky; interfemoral naked above and below; feet half free, in the wing to the base of the outer toe, in the interfemoral to the ankle; feet large and strong, with a few scattered hairs above; toes freely and widely opening from each other, so as to give a large grasp; claws compressed and sickle-shaped, rather feeble; the tip of the tail exserted.

When confined with other Bats this species attacks and kills all the weaker ones, devouring a portion of the flesh also.

I strongly suspect Mr. Hodgson's *Vespertilio muricola* to be none other than this. Dr. Gray says of it :—"Feet large, elongate, half free; tragus elongated, lanceolate, subfalcate." Mr. Hodgson did not describe it.

21. VESPERTILIO ADVERSUS.

Vesp. adversus, Horsfield, Zool. Res. in Java; Temm. Monogr. ii. p. 221.

This is a small species. The fur is somewhat long, dense, silky to the feel, and slightly frizzled or wavy; colour deep black, with the tips hoary on the underparts, and in some lights with a faint tinge of chestnut on the back; ears and membranes also black; nose, feet, and claws the same, giving the animal a very sombre and lugubrious appearance.

The foot is very small, and in the wing to the base of the outer toe, in the interfemoral to the ankle.

Carpus $1\frac{6}{16}$ in.; tibia $\frac{9}{16}$ in.; ear $\frac{1}{2}$ in.; nose to tail $1\frac{13}{16}$ in.; tail $1\frac{1}{2}$ in.; total length $3\frac{5}{16}$ in.; expanse $9\frac{14}{16}$ in.; tragus $\frac{3}{16}$ in.: Taken on 14th September. Another had the carpus $1\frac{7}{16}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{1}{2}$ in.; nose to tail $1\frac{13}{16}$; tail $1\frac{1}{2}$ in.; total length $3\frac{5}{16}$ in.; expanse $9\frac{14}{16}$ in.; tragus $\frac{3}{16}$ in., falcate. Taken the 30th September.

A third, a male, had the carpus $1\frac{6}{16}$ in.; tibia $\frac{1}{2}$ in.; ear $\frac{1}{2}$ in.; nose to tail $1\frac{10}{16}$ in.; tail $1\frac{6}{16}$ in.; total length 3 in.

A fourth, a female, differed only in being from nose to tail $1\frac{14}{16}$ in.

A fifth had the carpus $1\frac{4}{4}$ in.; nose to tail $1\frac{10}{16}$ in.; in other respects the same. These then, allowing for age and sex, are evidently all the same species; and all were recent specimens.

The ears are wide apart, placed low on the side of the head, the base being on a level with the gape, and the ear directed outwards. The shape would be a long oval, were it not for the deep emargination of the outer edge, from which point to the base the lower part of the lobe looks like a small second ear. The tragus is short, pointing inwards, with an obtuse rounded top.

This is a common species at Mussooree and in the Dehra Doon. It is early on the wing, coming out of caves and hollow trees, flying high, and is very rapid in its movements. Like *Vesperugo micropus*, when touched it opens the mouth wide, without emitting a sound, or making the least attempt to escape or bite, and will thus keep on the gape for several minutes, as if too much overpowered by sleep to be at the trouble of shutting it again, allowing it gradually and slowly to close, as if of its own accord.

Genus KERIVOULA.

Characters.—Feet half free; face hairy; ears lateral, diverging outwards; inner margin obtusely angular, outer margin rather sinuated; form, a long oval; tragus slightly falcate, narrow, bending outwards, half the length of the ear; nostrils at the end of the muzzle, divided by a slight notch; feet large; tail long; head broad; thumb long.

22. KERIVOULA FORMOSA.

Vesp. formosa, Hodgson, J. A. S. B. iv. p. 700.

Kerivoula formosa, Gray, Cat. Nip. Mam.; Cat. Mamm. Brit. Mus.

Hab. Nipal, Dehra Doon, and Lower Mussooree.

This handsome species, which was discovered by Mr. Hodgson in Nipal, occurs plentifully in the Dehra Doon, and at Mussooree, up to about 5500 feet.

Carpus of a male $1\frac{5}{16}$ in.; tibia $\frac{15}{16}$ in.; ear $\frac{11}{16}$ in.; feet large, and in the wing to the base of the outer toe, in the interfemoral to the ankle; tip of the tail free.

A female had the carpus $1\frac{5}{16}$ in.; tibia $\frac{15}{16}$ in.; ear $\frac{11}{16}$ in.; nose to tail $2\frac{14}{16}$ in.; tail 2 in.; total $4\frac{14}{16}$ in.; tragus half the length of the ear; ears diverging outwards, obtusely pointed, outer margin sinuate; nostrils at the end of the muzzle, slightly divergent; muzzle clothed, depressed. Taken in July.

Mr. Hodgson gives:—"Snout to rump $2\frac{1}{2}$ in.; tail 2 in.; total $4\frac{1}{2}$ in.; expanse $12\frac{1}{2}$ in.; teeth $\frac{2.2}{6}$, $\frac{1.1}{1.1}$, $\frac{6.6}{6.6}$=38."

The membranes, fingers, and ears are, in fresh or living specimens, bright ferruginous orange, except between the fingers, where the central line of the membranes is dusky black, contrasting strongly with the light orange; a small irregular dusky spot on the wing near the shoulder; face ferruginous yellow; body from the shoulders downwards ashy or dusky grey, with a faint tinge of ferruginous; head and breast paler; the claws and ends of the toes black; face rather obtusely sharp and projecting.

When preserved in spirits of wine, the orange-colour which gives so much beauty to the animal very shortly fades away.

Mr. Blyth notices another species from Central India, under the name of *K. pallida*, but by some curious error describes the *tail* as being "15 inches," or $1\frac{1}{4}$ foot!—the animal being about the size of the above.

23. HARPYIOCEPHALUS HUTTONII, Peters, n. sp.

This species occurs at about 5500 feet elevation on the outer southern range, but does not appear to be very common in the hills, judging from the paucity of specimens procured; and the Dehra Doon is probably its true locality.

Colour above light snuff-brown, somewhat paler beneath; carpus $1\frac{6}{16}$ in.; tibia $\frac{11}{16}$ in.; tail $1\frac{6}{16}$ in.; nose to tail $2\frac{1}{2}$ in.; total length $3\frac{1}{16}$ in.; expanse of wing about 10 in.; foot in the wing to the end of the second joint of the outer toe; interfemoral attached to the ankle, hairy externally, but nude beneath, with numerous cross lines.

The nostrils are subtubular and divergent, divided by a slight notch; and the ears are at the side of the head, rather large, and rounded at the summit; extreme tip of tail exserted beyond the membrane; tragus subfalciform, narrow towards the summit; feet somewhat hairy externally.

One of these flew into a room at Jeripanee, below Mussooree, attracted by the lights, on the 25th July, at about 9 o'clock. Instead of soaring round the room towards the ceiling, as Bats generally do, it kept low down, passing under the tables and chairs, as if afraid to emerge into the broad glare of the lamps. This likewise is the mode of flight when searching for insects in the open fields, where it skims closely and somewhat leisurely over the surface of the crops and grass.

[Type in coll. India Museum, London.—F. M.]

24. MURINA GRISEA, Hutton, n. sp.

This species was taken at Jeripanee at an elevation of 5500 feet; and as yet I have only seen this one specimen.

Carpus $1\frac{6}{16}$ in.; tibia $\frac{6}{16}$ in.; ear $\frac{7}{16}$ in.; nose to tail 2 in.; tail 1 in.; total length 3 in.; expanse of wings rather more than 9 in.; foot in the wing to the base of the toe, in the interfemoral to the ankle; tip of tail slightly exserted beyond the membrane; nostrils subtubular and divergent, giving the nose a notched appearance; tip of tail exserted; feet externally hairy; interfemoral hairy within and without; ears rather small, obtusely pointed, shaped as in *Rhinolophus*; colour above grey mouse-brown, beneath paler grey.

[Type in coll. India Museum, London.—F. M.]

Genus MEGADERMA.

Generic characters.—Ears very large, and united by their inner margins over the forehead, as in *Plecotus*; wings and interfemoral membranes large; mouth suctorial; on the extremity of the muzzle above is a thin saucer-shaped transverse membrane, in which are the nostrils; out of and behind this arises a broad membrane or leaflet; tragus narrow, falcate, bending outwards, less than a third of the ear; tail none.

25. MEGADERMA LYRA.

Meg. carnatica, Elliot, Cat. Mamm. S. Ind.
Meg. schistacea, Hodgs. (*apud* Blyth).
Meg. lyra, Geoff. An. Mus.; J. A. S. B. xi. & xii.
Hab. India generally, nearly to the Siwaliks in the north-west.

My specimens were procured at Delhi, in the Kootub, and measured as follows:—Carpus $2\frac{9}{16}$ in.; tibia $1\frac{6}{16}$ in.; ear $1\frac{5}{16}$ in.; rounded above; tragus about $\frac{1}{3}$ the length of the ear, pointed and subfalcate, with a projecting leaflet at its base, which is notched on the inner edge; ears joined together on the forehead for nearly half their length; feet in the wing to the base of the outer toe, in the interfemoral membrane to the ankle; fur, on the head, back, humerus, and lower half of the carpus, black; membranes and ears brownish, naked; beneath iron-grey; on the upper surface of the muzzle is a small subquadrate leaflet, somewhat saucer-shaped, in which are the nostrils concealed beneath an overlying lappet of membrane, immediately behind which rises an oblong square membrane, with a

thick perpendicular rib running up through the middle; there is no tail.

Although perhaps from the character of the mouth it might have been inferred that the habits of this animal were sanguivorous, yet nothing of the kind appears to have been suspected until the fact was made known by Mr. Blyth, who records the circumstance in an interesting notice in the 'Journal of the Asiatic Society of Calcutta,' vol. xi. p. 225 :—

"Chancing," says this observer, "one evening to see a rather large Bat enter an outhouse, from which there was no other egress than by the doorway, I was fortunate in being able to procure a light, and thus proceed to the capture of the animal. Upon finding itself pursued, it took three or four turns round the apartment, when down dropped what at the moment I supposed to be its young, and which I deposited in my handkerchief. After a somewhat tedious chase I then secured the object of my pursuit, which proved to be a fine pregnant female of *Megaderma lyra*. I then looked at the other Bat which I had picked up, and, to my surprise, found it to be a small *Vespertilio*, nearly allied to the European *V. pipistrellus*, which is exceedingly abundant, not only here, but apparently throughout India, being the same also, to all appearance, as a small species which my friend Dr. Cantor procured in Chusan. The individual now referred to was feeble from loss of blood, which it was evident the *Megaderma* had been sucking from a large and still bleeding wound under and behind the ear; and the very obviously suctorial form of the mouth of the vampyre was of itself sufficient to hint the strong probability of such being the case. During the very short time that elapsed before I entered the outhouse, it did not appear that the depredator had once alighted; but I am satisfied that it sucked the vital current from its victim as it flew, having probably seized it on the wing, and that it was seeking a quiet nook where it might devour the body at leisure. I kept both animals wrapped separately in my handkerchief till the next morning, when, procuring a convenient cage, I first put in the *Megaderma*, and after observing it some time I placed the other Bat with it. No sooner was the latter perceived than the other fastened on it with the ferocity of a tiger, again seizing it behind the ear, and made several efforts to fly off with it; but finding it must needs stay within the precincts of the cage, it soon hung by the hind legs to one side of its prison, and after sucking its victim till no more blood was left, commenced devouring it, and soon left nothing but the head and some portions of the limbs. The voidings observed very shortly afterwards in its cage resembled clotted blood, which will explain the statement of Stedman and others concerning masses of congealed blood being always observed near a patient who has been attacked by a South-American vampyre. Such, then, is the mode of subsistence of the *Megaderma*. The sanguivorous propensities of certain Bats inhabiting South America have long been notorious, but the fact has not heretofore been observed in the Old World: and the circumstance of one kind of Bat preying upon another is altogether new, though I think it not improbable that the same will be found

to obtain among the larger species, if not throughout the whole extensive allied genus of *Rhinolophus*, which, like *Megaderma*, are peculiar to the eastern world."

In confirmation of these remarks, Mr. Frith afterwards informed Mr. Blyth "that a number of these Bats were in the habit of resorting to the verandah of his residence in Mymensing (Burmah), and that every morning the ground under them was strewed with the hind-quarters of frogs and the wings of large grasshoppers and crickets. On one occasion the remains of a small fish were observed; but frogs appeared to constitute their chief diet—never toads; and of a quiet evening these animals could be distinctly heard crunching the heads and smaller bones of their victims."

Other species of Bats were noticed to keep aloof from this retreat; but Mr. Frith had no opportunity of confirming Mr. Blyth's observations that the *Megaderma* preys upon the smaller animals of its own tribe.

Mr. Blyth's suggestion of the probability of the *Rhinolophi* preying upon other species is to a certain extent confirmed by my own observations, and is in all probability the reason why the larger species keep aloof in pairs, instead of congregating, as do some of the smaller kinds. I have found that *Rh. luctus*, *Phyllorhina armiger*, *Nycticejus luteus*, *Miniopterus blepotis*, and *Vespertilio blythii*, when confined with some smaller species than themselves, will prey upon them.

I know of an enormous cave at Mussooree to which various species, both large and small, are in the habit of resorting for rest and concealment during the day. Standing within this spacious vault in the earliest hours, just before the first streaks of day appear, the spectator is perfectly astonished at the numbers of Bats resorting to it—not, however, in one promiscuous crowd, but in separate detachments, each seeking its own particular quarter of the cavern, and alighting against the sides, at first within reach of a butterfly-net, and commence crawling upwards and backwards to spots beyond the reach of invasion from below. Here in one spot will be seen a pair of *Rhinolophus luctus*, hanging high up, and quite apart from all the rest; in another place hangs a pair of *Phyllorhina armiger*, the large ears and the facial crests in active tremulous motion as the head is turned in every direction to ascertain that no intruder is nigh its dwelling-place, until, this restlessness gradually passing off, the animal hangs at length quietly suspended by the feet. In another direction are a dozen or more of *Rhinolophus minor* rapidly scrambling all together like a lot of crabs up the inequalities of the rocky surface, and hurriedly disappearing into some deep narrow crack or crevice; while again, in another part, the same scene is observed, as dozens of a very small species of *Nycticejus* scramble into similar hiding-places, to rest in peace until the hour for again emerging in search of prey calls them all forth once more respectively at their appointed hours.

5. On the Indian Wild Dog.

By Dr. James Murie, F.L.S.

[Received May 21, 1872.]

Captain Gildea, of the 21st Fusileers, presented to the Society a male and a female specimen of the Indian Wild Dog on the 4th of August, 1867. These animals were believed to be, and named accordingly in the Menagerie, *Cuon dukhunensis*, Sykes. Neither was an absolutely old animal, as subsequent examination showed; but they had the appearance of being adult. Unfortunately I learned when too late that the donor had expressed a wish that a photograph of the Dogs when alive should be taken. To make up for this unintentional inadvertence to the Captain's request, I had careful drawings made of their characteristic features from the dead body, some of which I here exhibit to the Meeting.

I am not cognizant of any observations as to their habits having been noted prior to their receipt by the Society. But I may mention that when in the Gardens they were exceedingly active, snapping, snarling, and in their general behaviour resembling a couple of Wolves rather than sedate Dogs. I am not aware that they were heard to bark; but occasionally they howled and whined.

Their *tout ensemble* conveyed to me the idea of a compound between Wolf, Jackal, and Fox, partly on account of their colour, partly from their size and general shape, and also partially from the contour of the head, ear-outline, and direction of the eyes. But, on the other hand, a critical inspection left the impression that they were more markedly of the Dog type.

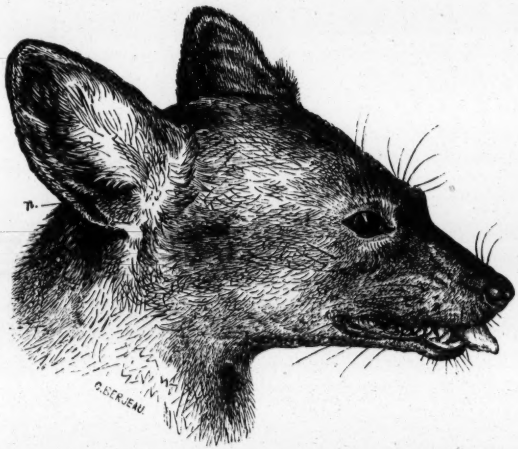
The pair of animals very nearly corresponded in size, so that the accompanying series of measurements of the female may serve as an indication of their stature and proportions:—

	inches.
Length from the snout to the tip of tail	42
Length of the tail	12
Height at the shoulder, about	15
Height at the loins	16
From the shoulder-joint to the tip of claws	14¾
From the hip-joint to the point, mid toe, hind limb	18
Head, measured from snout to occiput (following curve)	7
Breadth of forehead (between the eyes and ears)	4½
Breadth of forehead (between the eyes and the nose)	2½
Distance from eye to ear	3½
Eye distant from point of nose	2¾
Ears in length	3¾
Ears in breadth (in position)	2¼

Their colour was entirely reddish or fulvous brown, and remarkably like the tint of a Fox. The tip of the nose and lower part of the face were somewhat darker; and the tail also exhibited deepening of hue. Moreover, upon the outer side of the hind leg, and simi-

larly on the fore limb, there was a tendency, though a very indistinct one, to whitish spotting. The points of the hairs here and there throughout the body, by an addition of pigment, showed a disposition towards rather than absolutely possessed black tips.

Fig. 1.



Profile, from nature, of the head of the female Indian Wild Dog, presented to the Society by Capt. Gildea, 1867.
p. Pit or fossa of the tragus.

Of those features marking race, the tail was moderately lengthened, dark and full below, as in Jackal or Wolf, and not with the great round brush of the Fox. The eye had a certain obliquity; but the pupil, as far as I could ascertain, was round. Ears large, erect, and hairy. The deep pit or fossa, situate between what may represent helix and antihelix, which is large in Dogs and smaller in Foxes, was in our specimens of considerable dimensions. I omitted to record whether a cutaneous supracaudal gland existed. This structure, Mr. Bartlett assures me, is common to the Wolves, Jackals, and Dogs, and ordinarily is situate two or three inches from the root of the tail. The *Canidæ* notoriously sniff each other at this spot.

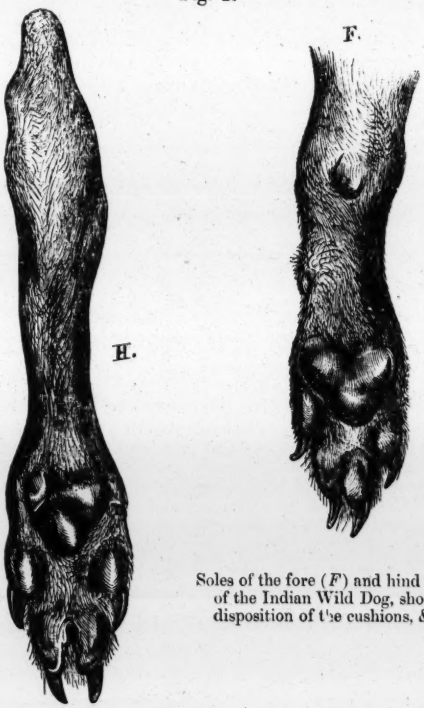
Regarding the feet, the subjoined figures display their characteristic points.

The female possessed fourteen teats, a number exceeding that generally met with in domestic Dogs, where from eight to ten is most usual.

There was nothing characteristic in the tongue; but of the soft palate I made the following memorandum:—Length of the ridged

palate 2·2 inches; breadth opposite the canines 0·8 inch; the widest part behind 1·4 inch. It was pale in colour, the intervening spaces smooth, the ridges rather rough. Anteriorly there was a semiridge with a median nipple and excretory duct, close behind which the arched ridges commence. Of these there were nine bow-shaped—that is, had a central backward indent; and this produced the appearance of a mesial longitudinal depression with cross-hatching.

Fig. 2.



Soles of the fore (*F*) and hind (*H*) foot of the Indian Wild Dog, showing the disposition of the cushions, &c.

The stomach was canine-like in formation. The œsophagus entered well to the left, with no adjoining *cul de sac*, and a wide but very moderate inflated fundus. The great curvature had a regular arch, with no special expansion towards the pylorus; and the lesser curvature was shallow.

Spleen flattish but altogether funnel-shaped, or with a broadish head and elongate tongue-shaped extremity. Entire length 6 inches;

head 2½ inches in diameter; and the opposite narrower part about an inch.

The entire gut had a length of 7 feet 5½ inches. Of this the small intestines measured 75 inches, and possessed a tolerably uniform diameter of about ¾ inch. Great intestines 14½ inches long. These have no fibrous longitudinal bands, and their calibre does not vary much, viz. about 1 inch in diameter. The cæcum was a simple diverticulum 2½ inches long and partially twisted upon its axis, which the accompanying woodcut illustrates better than a verbal description.

Fig. 3.



Cæ, cæcum; *C*, colon; and *i*, portion of the ilium.

Left lung deeply cleft and three-lobed; the right pulmonary organ had an additional lobule, the so-called *lobus impar*, which was bifid. In the female *Cuon* the bronchial and œsophageal glands were much enlarged and elongate; some of them inside swarmed with Entozoa. A few of these were kept for identification; but as time passed I lost sight of the specimens. Neither heart nor kidneys presented any differences from the same organs in the common Dog.

As regards the liver, this had the ordinary deep cleavage or segmentation less or more pertaining to the Carnivora. The left lobe was larger than the right, and the middle or cystic lobe about equal to the latter. Gall-bladder capacious, pyriform, and long-necked. Both caudate and Spigelian lobes relatively large and free.

I may say a word with respect to the anal glands, these being the only parts of the genito-anal region which attracted my attention as presenting any thing unusual. Exteriorly and around the anus there was a fair-sized bare oval space of a tawny colour. This was studded throughout by minute puncta, the openings of innumerable subcutaneous sebaceous-like glands, which kept the surrounding cuticular parts moist with their peculiar-smelling secretion. Besides these follicles, two much larger orifices were apparent. The latter were situate one on each side of the anus (see fig. 4), and they communicated by a duct with a small subdermal glandular body.

Among the numerous races of Wild Dogs the genus *Cuon* has been separated chiefly on account of the anomaly of its dentition. De Blainville, in his meritorious 'Ostéologie,' illustrates most of the cranial and dental characters; but the most recent literature and

revision of the group is Dr. Gray's paper in our 'Proceedings' for 1868 (p. 492).

Fig. 4.



Glandular space around the anus in the female *Cuon*.
a. Anus. *gl*. Anal duct leading to gland.

The generic diagnosis of *Cuon* has been given:—"Skull short; nasals elongate; teeth forty; tubercular grinders $\frac{2-2}{1-1}$, the lower hinder tubercular grinder deficient." So far Capt. Gildea's specimens agree; but I have doubts as to the propriety of distinguishing *Cuon* from *Canis*, seeing that in the latter dental variation occasionally obtains.

Dr. Gray enumerates four species:—1. *C. primævus*. 2. *C. alpinus*. 3. *C. sumatrensis*. 4. *C. dukhunensis*. From his remarks I apprehend he looks upon the first two as tolerably alike, and, so far as cranial features tell of a diagnosis, barely draws a line of demarcation between the Sumatran and Siberian species. To that named Dhole by the natives of the Deccan (the *C. dukhunensis*) he attributes a more slender nose and higher forehead. I have myself compared the whole of the *Cuon* skulls in the national collection, including the subject of the present paper, and, I confess, without being able to detect veritable separation between them, excepting size. That from the Deccan, forwarded by Col. Sykes, as Dr. Gray has observed, is juvenile, and therefore not at all to be relied on

osteologically as distinctive of a type. Capt. Gildea's specimen, save being a trifle smaller, resembles closely the crania of the Nepalese and Siberian Wild Dogs.

Reverting for a moment to the literature and original descriptions, Major-General Hardwicke's* claims priority. Now his account of the Sumatran Wild Dog answers very well indeed to that of the subject of our sketch, but there is a decided want of life-like character in his drawing, which detracts from the physiognomy of the animal. The remarks upon its colour, habits, voice, eyes, ears, and tail are a perfect counterpart of Capt. Gildea's animals.

Although Col. Sykes† compares his "Kolsun," or Dukhun animal, to "a coarse ill-natured Persian Greyhound, without any resemblance to the Jackal, the Fox, or the Wolf, and in consequence essentially distinct from the *Canis quao* or *sumatrensis*," yet his points do not lead me to infer much difference other than a shade lighter hue of the hair on the underparts. Pallas's‡ reference to *C. alpinus* shows a stronger-bodied, paler-coloured, and shaggier-haired Dog. Lastly, Hodgson's§ "Búánsú" is precisely an intermixture of the foregoing both as to size, colour, &c. He observes, however, that it hunts in packs, following the prey by smell, and at such times barking in a peculiar manner.

In looking over the stuffed skins in the British Museum, it is apapparent that between the southern and northern forms there is a gradation of hue and dimensions. The tint of the pelage in the former is ruddy, and in the latter a sandy mixture,—white on the underparts and lengthening of hair keeping pace with the latitude north.

The question resolves itself into this—Are these varieties to be regarded as specifically distinct? Now, I am aware that entomologists and ornithologists every day are piling a literature of new species upon exterior shades of difference occasionally less marked than in the foregoing; and were mammalogists to follow the same course an endless multiplication of specific forms would ensue. Against this phase of zoological science I am one of those that protest. Are we to consider, for example, the Tiger a different animal because the density of its coat varies when inhabiting the torrid jungle of Hindostan and the verge of the snow-line in Amoorland? A thickening and lengthening of hair is apparent even after being but a couple of years in the comparatively mild climate of Britain, as my friend Mr. Bartlett avers. Size is no infallible standard; and pallor of tint we know increases the more northern the clime.

The genus *Cuon* I regard but as possessing one species and, geographically, it may be, four varieties. The young in all are light-coloured.

As to what ought to be the trivial or specific name, Hardwicke's appellation is the earlier one; but unfortunately both it and Pallas's

* Trans. Linn. Soc. 1822, vol. xiii. p. 235.
† P. Z. S. 1831, p. 100.
‡ Zoog. Rosso-Asiatica. vol. i. p. 34 (St. Petersburg, 1831).
§ Asiat. Research. vol. xviii. p. 221, and P. Z. S. 1833, p. 111.

bear a local signification, which detracts from broad views; hence that of Hodgson (*Cuon primævus*) best merits recognition. Besides it suggests, whether true or not, the idea of a primitive stock, whence many races are derived.

6. Observations on the Macaques.—I. The Bornean Ape. By Dr. James Murie, F.L.S., F.G.S., &c.

[Received May 21, 1872.]

Almost fifty years ago (viz. 1823) the French *savants* of the Jardin des Plantes had registered and figured some seven or eight of the group of Monkeys known as the Macaques. This name of Macaque was latinized into *Macacus* by Desmarest; and the appellation has been retained for the genus.

Since the above-mentioned date the number of acknowledged species has increased twofold, and the majority of these determined by our own countrymen. Even till now additions are forthcoming as travellers penetrate into Eastern regions hitherto inaccessible. As might be expected, there have been doubts cast upon some of the species; and of others, externally better defined, the internal peculiarities have been passed unnoticed or unheeded. A few of the rarer forms have come under my inspection, and offered materials for this and subsequent notices.

In the 'Histoire Naturelle des Mammifères,' by MM. Geoff. Saint-Hilaire and Fréd. Cuvier, a Monkey is described and figured, "Le Macaque de l'Inde," from a sketch by M. Duvaucel. The authors proposed the trivial name of *maurus* to it. Meanwhile no actual specimen had reached Paris; so that nearly thirty years after (1851) Geoff. Saint-Hilaire, in the 'Catalogue Hist. Nat. du Muséum,' doubted the very existence of the species. Even M. Quoy suggested the animal's being taken from a bad specimen of *Cynopithecus niger*. Nevertheless an animal came into the possession of this Society in 1860 which Dr. Sclater recognized as the *M. maurus*, F. Cuv. Since then another example has turned up (*vide* P. Z. S. 1871, p. 222); so that the identification of the doubtful species has been satisfactorily solved.

But the moot point, the purport of this paper, has still to be considered—to wit, the relation of the Bornean Ape *Macacus inornatus* to *M. maurus*. The type of the former reached the Gardens and died in the same year, 1866. Dr. Gray was puzzled with it, and, while admitting (P. Z. S. 1866, p. 202, pl. xix.) likeness to Cuvier's doubtful *M. maurus*, nevertheless from its peculiarities named it afresh. On the demise of the Ape I had a favourable opportunity of comparing it with museum specimens, &c., and concluded that it answered best of all to the illustration in the 'Hist. Nat. d. Mam.' I was then so situated that I could not publish my notes, but now bring them forward. Dr. Sclater (P. Z. S. 1871)

insists on the identity of the two species, which my observations support; the early name, therefore, must stand.

The synonymy, then, runs thus:—

MACACUS MAURUS (Fr. Cuv.).

"*Le Macaque de l'Inde*" (or Moor Monkey = *Macacus maurus*), Frédd. Cuvier et Geoff. St.-Hilaire, Hist. Nat. des Mamm. April 1823, pl. 45; Sclater, P. Z. S. 1860, p. 420, et P. Z. S. 1871, p. 222.

Magus maurus, Lesson, Manuel de Mammalogie, p. 44.

Cynocephalus niger?, Quoy et Gaimard, Voy. d'Astrolabe, i. p. 67, and remark, p. 72.

Simia cuvieri, Fischer, Synopsis Mammalium, p. 30.

Inuus maurus, W. Vrolik in Todd's Cyclop. of Anat. and Physiol. 1852, iv. p. 197.

Pithecus maurus, De Blainville, Ostéographie, tome i. pl. x. (dentition of young).

Macacus inornatus, Gray, P. Z. S. 1866, pl. xix. p. 202; ibid. *M. maurus*?

Macacus speciosus?, Gray, B. M. Cat. of Monkeys, Lemurs, and Fruit-eating Bats, 1870, p. 32.

In addition to the descriptions and diagnosis already published, I append the notes I made on the exterior characters &c. of the dead body of the female termed *M. inornatus* by Dr. Gray.

Ears black and nearly bare of hairs; face of the same colour, and bareness extending round the angle of the mouth. There is an appreciable though faint moustache of long and sparse black hairs. The hairs on the side of the head extend inwards in a wedge-shaped manner upon the malar bone. Upon the frontal region the hair is short and nearly black; but the cheeks, temporal region, and occiput have a sooty tinge. This latter tint extends over all the body and limbs, being considerably lighter upon the lower side of the neck, the chest, the abdomen, the inner aspect of the limbs, and also at the rump. There is even a greyish intermixture at the inner side of the forearm and lower leg. I may also observe that the pubic part of the abdomen and the groins are almost devoid of hair.

A pair of callosities, each $1\frac{1}{3}$ inch long, obtain. The ischium on either side of the tail has only slight downy hairs, and the skin is of a roseate shade or flesh-coloured.

Iris of a dark hazel hue; and the pupil is of large size. The nose is flat and by no means prominent; and the nostrils slant well outwards.

	inches.
Body.	
Extreme length from superciliary ridge to callosities	18
From nape of neck to root of tail	13
Girth of the chest (about its middle)	$12\frac{1}{2}$
Girth of the abdomen	$9\frac{1}{2}$
Tail in length (slightly curved upwards)	1
Tail in circumference	$1\frac{1}{2}$
Fore Limb.	
From shoulder-joint to tip of mid digit	15

	inches.
From the shoulder to the elbow-joint	6
From the elbow-joint to the wrist	5
Greatest length of the palm	4
Breadth of the palm to the root of the pollex	1
Length of the middle digit	$1\frac{1}{2}$
Length of the thumb or pollex	$0\frac{7}{10}$

Hind Limb.

From hip-joint to middle digit	16
Hip-joint to the knee	6
From the knee to the heel	5
Greatest length of the sole of the foot	$5\frac{1}{2}$
Breadth of the sole	$1\frac{1}{2}$
Length of the middle toe	$2\frac{1}{4}$
Length of the great toe or hallux	$2\frac{1}{4}$

Head.

Circumference in front of ears	10
Face, from the frontal ridge to the chin	3
Between the frontal ridge and inner opening of nares	$1\frac{1}{2}$
From the frontal ridge to the occiput	5
Breadth to outer aspect of malar region	$2\frac{3}{4}$
Width to the outer angles of the orbits	$1\frac{6}{10}$
Distance from median line upon lip to outer angle of orbit	$2\frac{1}{4}$
Distance from median line to root of the ear	4

In outward aspect there is undoubtedly considerable resemblance between the Moor Monkey and the Ashy-black Ape (*Macacus ocreatus*, Ogilby). Indeed, in their juvenile stage a most practical naturalist among living animals (Mr. Bartlett), as well as Dr. Sclater himself, have been deceived regarding the two. The former gentleman relates to me how that he purchased two young animals which he in every way regarded as representatives of the Bornean Ape (*M. inornatus*? = *M. maurus*). Much was his astonishment, therefore, to find one of them develope into a typical Ashy-black Ape (*M. ocreatus*). There can be no doubt they are two forms closely allied. But the adult of the latter is distinguished by a deeper sooty tint of the upper parts; and underneath and on the limbs, &c., very characteristically displays the ashy hue, wherefore its name. Its tail also is a trifle longer and somewhat curled forwards; and the hair of the head has a bushier appearance. Relatively it is a higher-limbed Monkey than is *M. maurus*.

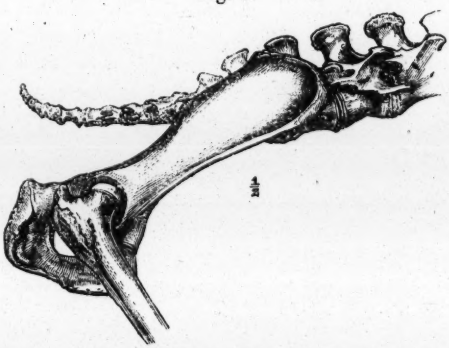
Another Monkey with which *M. maurus* has been confounded is the *Cynopithecus niger* or *nigrescens*. But our specimen differed sensibly and markedly from Schreber's* figure, and from the living example now in the Gardens. The former is destitute of the great hairy crest so conspicuous in the latter, although, it is true, the fur on the vertex is a shade longer than at other parts. Its forehead is

* Die Säugethiere, vol. v. 1855, p. 61, tab. 6. *Papio nigrescens*, Temm. Possess. Néerl. dans l'Inde Archipél. iii. p. 111.

not bare of hairs, but, on the contrary, has an elevated fringe extending quite across the superciliary ridge. Schreber gives a rusty brown upon the neck and shoulders, absent in our *M. maurus*. But, apart from colour, the physiognomy is most unlike, the canine ridges of *C. niger* being prominent. When the skull is taken into consideration, the two forms are instantly admitted to be widely distinct.

The other two short-tailed Macaques (*M. speciosus* and *M. arctoides*) cannot be mistaken for *M. maurus*, if only on account of their flesh-coloured and more often bright-red faces.

Fig. 1.



Pelvic region of the Moor Monkey in profile, with upper femoral segment in natural position.

The skeleton of the foregoing animal, described by Dr. Gray, is mounted in the British Museum; and, fortunately, the spine has been left with its intervertebral attachments.

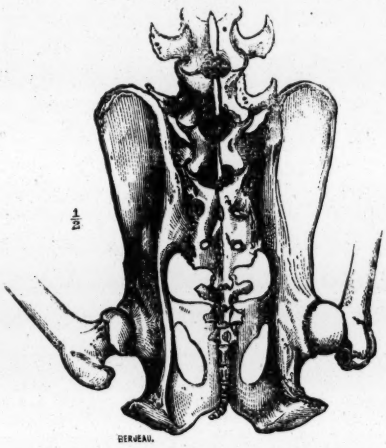
Of cervical, dorsal, and lumbar vertebræ I need but note their numbers are seven, twelve, seven, respectively, the last lumbar vertebra having its transverse processes attached to the ilium by a strong ligamentous union. Metapophyses and anapophyses are conspicuous in all save the last two lumbar vertebræ; but in the eleventh and twelfth dorsals they are fairly developed.

The sacrum consists of three less or more ankylosed vertebræ, whereof two form a wide ovoid surface, and abut against the sides of the ilium by a loose sacro-iliac synchondrosis. The transverse processes of the third sacral are narrower and shorter than the two preceding, viewed inferiorly; but on the dorsum the laminæ are subequal in all three. A neural spine is fairly developed in the anterior sacral, but in the two posterior ones it is only represented by a thin, sharp, and continuous ridge of bone.

The shortening of the tail is one of the notable features of the Bornean Ape, as distinguished from certain others of the genus *Macacus*. In this instance the extreme length of the caudal verte-

bræ is 1·7 inch; and of this the first three with transverse processes are 0·7 inch, and the remainder 1 inch in antero-posterior diameter.

Fig. 2.



Superior aspect of sacro-caudal vertebræ and pelvis.

Fig. 3.



Facial view of skull and mandible, and the dentition.
B superior, and C inferior jaw, slightly over two-thirds nat. size.

The number of vertebral centres in the caudal region are altogether ten, but unless carefully examined appear no more than seven or

eight. The foremost three caudals have a large spinal foramen; and in two the neural laminæ meet but are devoid of spine; in the third, ossification of the neural element is imperfect. The transverse processes of the three diminish from before backwards, and in the succeeding fourth caudal are reduced along with laminar structure to mere rudiments. The succeeding vertebræ, altogether smaller, are laterally compressed, deficient in processes, and the final and antepenultimate ones tiny ossicles, requiring good eyesight to distinguish them. A few diminutive cartilaginous-like nodules on the under surface of the caudal vertebræ I take to be rudiments of chevron bones. As I have shown in fig. 1, the tail barely reaches the tuberosity of the ischium, or at most is vertical to its upper anterior prominence.

The caudal vertebræ have terminally a very slight upward curve, and veer a trifle to the left of the median line.

In a roughly cleaned specimen of the pelvis of the Ashy-black Macaque (*M. ocreatus*) in the British Museum I find the caudal region to be very like the one under immediate consideration. The terminal ossicles seem more numerous by one or two; but in absence of processes beyond the third and inclination to the left it agrees; whilst in the upward bend it is more curled forwards, terminally being tipped by fibroid tissue.

The skull, compared with those of the genus generally, is of the true Macaque type. Facially the supraorbital ridge is well marked and prominent, with high superior external orbital angles. The outer edges of the latter drop perpendicularly to the malar bone; and there is such incontestable flattening of the anterior surface of the orbito-jugals and ascending maxillary process, as to give a very characteristic squareness to the superior half of the face. In old skulls of the Rhesus the orbital facial moiety approaches the condition here spoken of, but not so those comparable in age with ours. Moreover their malar arch is much curved and stands well out, whereas in *M. maurus* it is flat and by no means prominent. Neither of the square-visaged Monkeys (*M. cyclopis* and *M. assamensis*) agrees with the Moor Monkey in the above characters; and they, as well as *M. rhesus*, have a fulness in the muzzle or maxillo-premaxillary region.

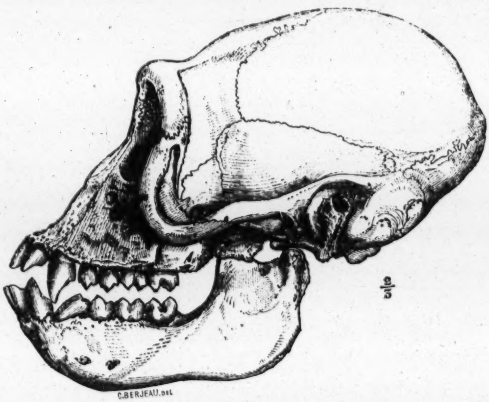
In profile the skull inclines to shortness, the contour otherwise agreeing best with the Assam species. This is particularly the case in an anterior depression of the frontal, which is also slightly observable in *M. radiatus* and *M. cyclopis*. In the other Macaques there is an elevation at this spot, it being greatest in *M. speciosus*. I speak of adolescent skulls only; for as age progresses the supraorbitals become so prominent as entirely to alter the relation of parts.

The parieto-occipital region is but moderately full, the sagittal line being elevated more than the average in the genus. The coronal region is low, which gives a flattish crown, therefore unlike *M. speciosus*.

In this young female the stomach had an elongate pyriform shape, the pyloric end, however, not being so narrow and drawn out as

generally is the case in the Spider Monkeys (*Ateles*). As regards its admeasurements, I noted:—Distance between the œsophagus and the great curvature 2·2 inches; diameter or width from the cardiac to œsophageal ends 4·8 inches; greatest diameter of the cardiac end 1·6 inch; the upper or lesser curvature 3·2 inches; width of the œsophagus as it enters the stomach ½ inch. These computations I presume were made on the empty viscus.

Fig. 4.



Macacus maurus = *M. inornatus*, female.

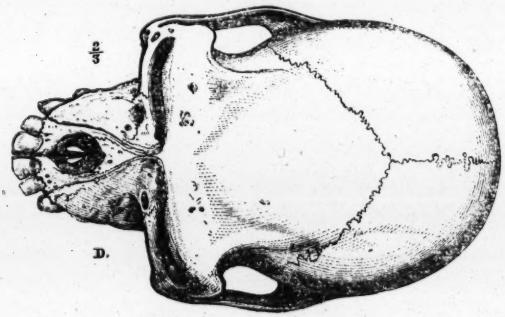
The small intestines had a length of 61 inches. The ileum narrows slightly as it joins the great intestine, its diameter being 0·7 inch. Cæcum short and wide, viz. 1·7 inch long, and 1·4 inch wide. Including the cæcal appendage, the great intestine measures 25½ inches. For the first 5 inches it is wide, then narrows by degrees to the rectum, where it is less than 1 inch in diameter. The longitudinal bands are strong, and the sacculations few, beyond 7 or 8 inches from the commencement of the gut.

The lungs were quite healthy, trilobed, with an additional lobule or *lobus impar*. The spleen was immensely enlarged, congested, and had distributed throughout its substance numerous encysted abscesses averaging the size of peas. Kidneys of the usual oval contour, the right the larger by a quarter of an inch.

Of the liver, the left lobe may be said to be the largest and flattest. Its borders are slightly scolloped, producing several angles; but there are no deep grooves or indentations; the entire lobe is well nigh cut off from the others, the union being by a narrow pedicle. The right lobe is thick and oval-shaped. The gall-bladder is sunk deeply into the cystic lobe, the left surface of the latter having a projecting lobule and two shallow clefts. Both Spigelian and cau-

date lobes are small and considerably adherent. Upon the posterior or abdominal surface of the hepatic organ I found a number of hydatid sacs. These were to some extent free, being attached to the substance of the liver by short pedicles.

Fig. 5.



Skull, seen directly from above.

Of the male organs of generation nothing is known; but I presume the penis may resemble that of the short-tailed Japanese and Ursine Monkeys. In both of these there is a large-sized bone and other peculiarities, which I shall describe in a future communication.

In our female specimen the vagina, 1 inch long, had chiefly transverse rugæ, which were far from being prominent; the lips of the os tincæ project much into the vagina. The uterus, from the fundus to the os, is 2·2 inches long, but interiorly is no more than 0·4 inch in each diameter, the thick walls having the usual transverse and longitudinal rugosities. Urinary bladder globular, with a very short narrow neck.

June 18, 1872.

J. Gould, Esq., V.P., F.R.S., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of May, 1872:—

The total number of registered additions to the Society's Menagerie during the month of May 1872 was 154, of which 32 were by birth, 87 by presentation, 28 by purchase, 1 by exchange, and 6 were received on deposit. The total number of departures during the same period by death and removals was 88.

The most noticeable additions during the month of May were as follows:—

1. A fine female Spider Monkey, purchased of a Liverpool dealer, May 3rd, which appears to be the female of *Ateles variegatus*,

Wagner. Of this species we have once before received a single specimen (see P. Z. S. 1871, p. 223).

2. A female Douroucouli, purchased of the same dealer, May 7th, which, so far as I can tell from the examination of the living animal, belongs to the species recently described by me (*anteà*, p. 3) as *Nyctipithecus rufipes*.

3. Five Spotted-billed Ducks (*Anas pœcilorhyncha*), presented, May 16, by Mr. E. Buck, of the Indian Civil Service. We have had two males of this fine Duck in our Gardens for four years, but, although I have applied to many of our excellent Indian correspondents on the subject, have never previously succeeded in obtaining females. Mr. Buck's kind present has supplied us with specimens of this sex; so that we may hope to induce the species to breed with us.

4. Two male Argus Pheasants (*Argus giganteus*), presented to the Society by Mr. J. G. Fanshawe, F.Z.S., May 28th.

The first specimen of the Argus Pheasant received alive by the Society was that brought back by the late Mr. Hugh Cuming, on his return to this country from the Philippine Islands in June, 1840, which lived several years in the Gardens.

In October last year, however, Messrs. Smith, Fleming, and Co. deposited in the Society's care a pair of this magnificent bird, and a second pair in January last. Of these the two hens are still living in our aviaries; so that at the present time we have two pairs of Argus Pheasants in the Gardens.

Mr. Sclater exhibited a pair of Ceylonese birds which had been sent home to him for examination by Mr. W. Vincent Legge, R.A., F.Z.S., with the following description:—

"*Male*. Length $4\frac{3}{20}''$; tail 1·2″; wing 2·3″; tarsus ·5″; mid toe with claw ·5″, hind toe $\frac{5}{20}''$; bill to gape $\frac{19}{20}''$, at front nearly ·4″. Third primary longest, slightly longer only than second.

"*Descr*. Iris reddish; bill, upper mandible black, lower mandible lightish at the base; legs and feet blackish brown; entire head (except the chin and throat), hind neck, back, rump, and lesser wing-coverts dull steel-blue, palest on the rump, and with the bases of the feathers dark; quills blackish brown, the basal portion of inner webs, with the under wing-coverts, white; tertiaries, greater wing-coverts, and tail black, the former edged with the hue of the upper surface, the latter with the three outer feathers white towards the tip, the colour extending a little up the shaft on inner web, the next two with a small terminal white spot; chin, throat, and chest white, below which the under surface is saffron-yellow, paling at the vent; under tail-coverts white, edged pale yellow.

"*Female*. Length 4·1″; wing $2\frac{5}{20}''$; tail 1·1″. Bill slightly lighter in hue than ♂; legs, feet, and iris the same as ♂; head and hind neck faded bluish ashen, centres of feathers dark; back olivaceous brown; secondaries and wing-coverts brown, edged with olivaceous; quills lighter than in the male; sides of neck and chest ashy beneath, paler yellow than the male, mingled with grey on the flanks; tail brownish black.

"*Hab.* Forests of the low hills in the southern province, where it affects principally the creepers which entwine the trunks of the trees; resorts also to small branches of low trees.

"*Food.* Seeds and pollen from the flowers of creepers.

"*Note.* A faint monosyllablic chirp like 'tse.'"

Mr. Sclater remarked that these birds appeared to belong to a new species of the genus *Prionochilus*, for which, as Mr. Legge had proposed no name, Mr. Sclater suggested the specific term *vincens*, after one of the names of its discoverer. The discovery of a species of this Malayan group in Ceylon was quite new, and of great interest.

The following papers were read:—

1. On the Cranial Appendages and Wattles of the Horned Tragopan. By Dr. James Murie, F.L.S., F.G.S., &c.

[Received May 25, 1872.]

(Plates LX. & LXI.)

1. As to Display during Courtship.

Most persons have witnessed and well know the grand display of the Turkey-Cock, when he struts majestically, with erect tail, blood-red throat, distended wattles and caruncula, the very essence of unbounded pride, anger, or lust, reaching its climax in a ludicrous gobble. The Pigeon, without obvious vascular turgidity or change of colour of the head and neck, woes his mate with dilated crop, rapidly utters an amatory note, and wheels himself about, finally rears up to full height, and rushes along, sweeping the ground with stiff outspread tail. Less known but equally characteristic are the habits of the Bustards, and especially the Australian species, which, during sexual excitement, develops an enormous wind-bag in its throat and neck. This it blows out even till almost reaching the ground, and, throwing back its head and forward its tail till they meet, the bloated bird stutters along, the very picture of stupid vanity *.

A sight which few have witnessed, yet almost a spectacle in its way as far as concerns the economy of birds, is the sexual advances of the male of the Horned Tragopan (*Ceriornis satyra*) during the breeding-season. This has been pictorially represented by two of our best zoological artists †, and lucidly described by more than one competent observer. I have myself, on more than one occasion, seen the male birds in the Society's Gardens momentarily and partially erect their horns; but never was fortunate in being present at what may be termed a full performance. Mr. Bartlett has assured me it was a perfect surprise to him, when first he saw the Tragopan suddenly flash up a

* *Vide* P. Z. S. 1868, pl. xxxvi.

† Wolf's 'Zoological Sketches,' 2nd ser. pl. xxxix., and Mr. T. W. Wood, pl. in 'Intellectual Observer,' Sept. 1863.

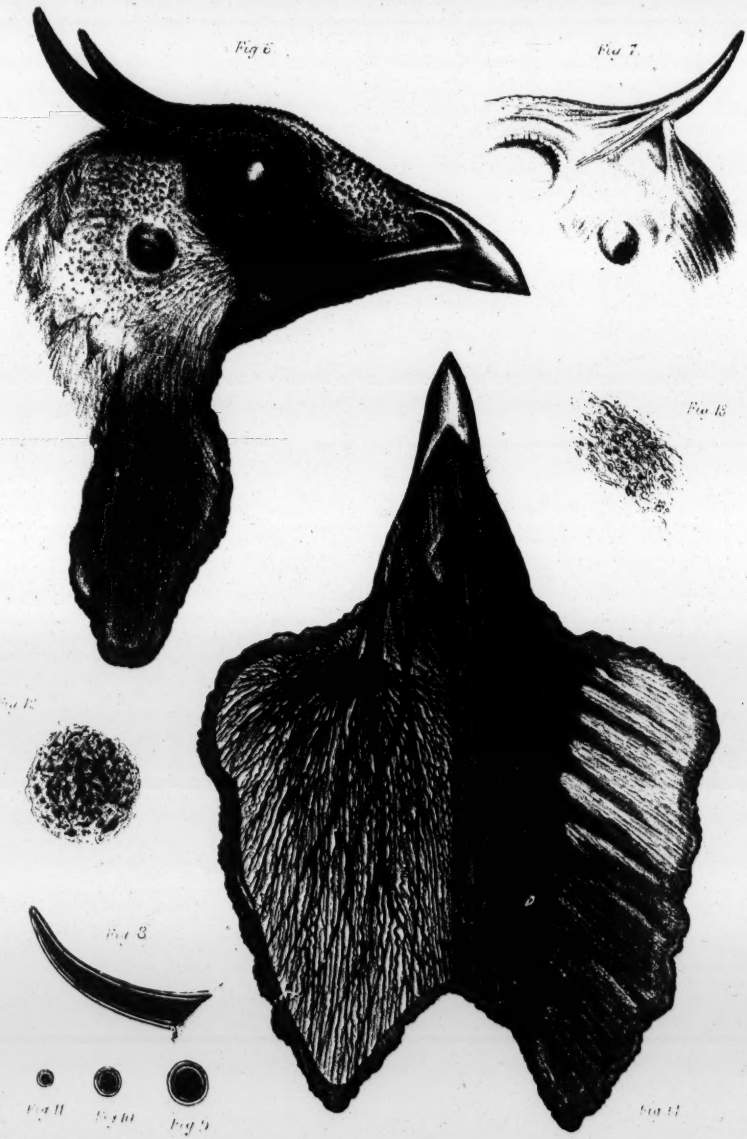

Fig. 2.
h


h
h
Fig. 1


Fig. 3


Fig. 4

BRITISH MUSEUM 2000673


Fig 6.
Fig 7.
Fig 13.
Fig 12.
Fig 8.
Fig 11.
Fig 10.
Fig 9.

BRITISH MUSEUM

a pair of blue horns and dash out a beard-like apron of bright scarlet, suggestive of a gnome or the evil one.

The male is said to "show off" in three modes * :—

1st. He stalks in front of the female; then crouching with tail bent down, the head and neck move up and down with vibratory jerks; the wings have a flapping motion, bringing the red patch into view; the horns are raised, and the great scarlet wattle unfolds with startling effect, while the bird draws himself up to full height as an object of splendour.

2nd. On some occasions he simply erects all his feathers, and elevates one shoulder without showing his head-dress.

3rd. Standing boldly on a perch he tosses the head, when the horns and wattles appear for a few moments.

I may add a fourth, viz. erection of the horns without display of the wattle.

2. Outward Head-dress in the Two Sexes.

It is, however, to the structure and physiology of the apparatus that I invite attention. In a study of the phenomena several specimens, and in different stages of development, have been investigated by me.

My first example was a young female, wherein externally there was only a nipple-like process, representing the so-called horn, and little or no development of wattle. On removal of the skin of the head, two small processes, arising from the parietals or postfrontals, were apparent, one on either side. These consisted only of tough, elastic, fibrous material, firmly adherent to the bone, and without any special vascularity around.

I come now to speak of the older birds, and for the sake of precision give in detail a description of two. One was bred in the Gardens in June 1864, and died of tubercle of the liver in May 1867. This adult male was in good plumage, but not so brilliant in hue as the newly imported and breeding-specimens from India. The drawings (Plate LX.), sketched from the fresh body, bring out the important points worthy of consideration.

The horns exteriorly are of a beautiful azure-blue colour, soft, yet tough and elastic to the touch. Each free portion measures 0·7 inch in length. Pressure of the finger upon the occipito-frontalis directs the horns upwards almost to the perpendicular; but when at rest or in their usual position they lie slantingly backwards. Ordinarily they are hidden by the feathers, but when erect pout out between the lateral black feathers and the gorgeous red ones of the vertex of the cranium.

The superficial blue skin structure, continuous with the horn covering, runs forwards upon the upper border of the orbit, and encircles the latter, where it is partially covered by short dark-coloured feathers. It extends more strongly marked the whole length of the lower mandible from the angle forwards. It is bare, and prominently

* Bartlett, "Remarks on the Horned Tragopans," Intellectual Observer, Sept. 1863, where he refers to Mr. Wood's notes &c.

seen at the angle, but anteriorly is partly hidden by the short black feathers.

Beneath and between the mandibular rami the skin is very loose, baggy, and easily moved. The numerous cutaneous folds are chiefly longitudinal; but the general appearance is a sort of wrinkled puckering. The brilliant smalt-blue at this spot is modified by the short black feathers, which latter are pretty freely distributed. In this the contracted state an elevated mesial linear and laterally compressed ridge is very noticeable posteriorly. This hangs as a sort of free lappet, and is of a most brilliant shade of blue. On either side of this central lappet the rich blue skin of the gular region ends in four or five long sharp-pointed digital lines; these increase in length from within outwards. The outside one of all is very broad and remarkably finger-shaped. Its minor posterior free extremity bends towards the median lappet, which, indeed, it joins by a transverse semilunar narrow ridge, behind which the feathering commences. The intervals between the digitations are bare, pale, and flesh-coloured, but at certain seasons assume a bright red hue.

The pair of loose dependent folds or flaps, which in reality constitute the single dilatable wattle, in ordinary conditions are drawn towards each other, so that the bare blue-coloured skin is in a great measure hidden. In the pride of lust, however, these flaps increase in size, open out or dilate, and there is displayed a gorgeous blue and red gular region and wattles.

3. Cranial Dissection of a Male in Season.

The body of the above having been disposed of for the purpose of being stuffed, I had to postpone further anatomical investigation. But another specimen at a later period yielded me a dissection of the parts. This Tragopan was in splendid order, and his wattles and horns most ample, he having been accidentally killed by concussion against the enclosure through fright in the pairing-season; for Mr. Bartlett believes these birds monogamous *. Circumstances did not permit my injecting the head and making a preparation, which I could have wished to have done. But to improve by the occasion I made dissections, the result of which I proceed to describe. The sketches supply deficiencies in the foregoing account, and show the respective areas of blue and red, with horns and wattles of full dimensions.

The blue colour, it is to be observed, is permanent, and not due to temporary venous turgescence, while the gorgeous scarlet is evanescent, and the result of flow of blood to the parts. I accentuate these facts, because I myself at first mistook the import of the difference of hue. Until instituting a thorough examination I regarded the horns as vasculo-erectile organs, which I am now prepared to show is not the case.

The whole of the area on the cheeks, supraorbital parts, horns, gular region, cross lines, and border of the wattle, which is coloured blue, is simply a tinted pellicle of the dermal covering. By ordinary

* See remarks, p. 70. in paper already quoted.

manipulation it can be easily removed with the dermis, as is shown in part, figs. 6, 7, & 14. In this respect it is analogous to the gorgeous head- and throat-covering of the Cassowary, and to the varied dermal coloration of the cheeks and wattles of many other birds. Microscopic examination shows that the colour of the said parts in *Ceriornis* is caused, as in the dark races of man, by a substratum of pigment. The large pigment-cells, however, in the Tragopan, are of a deep blue; and according as they are in mass or more sparsely aggregated, so is the intensity of the shade. On the throat, and especially the broad strip of the wattle, the general outward colour is dark indigo, much deeper even in some parts by the addition of the black filiform feathers; but here and there are small oval spots of a brilliant smalt, which shine like spangles among the feathering.

(a) *Pseudo-horns, and how erected.*

The cranial appendages or horns have superficially a casing or layer of coloured skin precisely similar in composition to that I have above described. This outer sheath is adherent, but loosely attached to the parts beneath—and on maceration is easily removed *en masse*, along with the dermal tissues of the forehead and face. Beneath it there is a delicate and transparent enveloping layer of fibrous and elastic tissue, intermingled with unstriped muscular bundles, and a trace of the striped variety at the root—besides what appeared to me as vessels, and probably nerve-fibres.

Lastly, and deepest, is the long, conical, and pliant core, or horn proper. This is solid, and composed throughout of firm elastic and condensed fibro-cellular tissue, almost rivalling cartilage in density. Externally it is nearly black in colour, but on cross-section is seen to be a trifle lighter centrally. A thin transverse slice about the lower third is translucent, and, held up to the light, exhibits a grey interior, gradating outwards to a narrow rim of deeper hue. The blackish colour, however, increases higher up. Towards the upper third there is a small, more or less oval, bluish-white circumscribed spot, situate rather to one side of the centre, around which, from a sombre brownish black, the tint merges into the deeper black. Quite at the tip the light interior, or medullary-looking layer, is barely perceptible. Under the microscope, with a low power, the exterior fibres are observed to be predominantly circular in direction, those within chiefly longitudinal and oblique. The deep colour results from a meshwork of pigment-spots distributed everywhere, but are in greatest abundance at what may be termed the cortical layer. Each pseudo-horn springs direct from the cranial bones, at a roughened eminence between the junction of the postfrontal and parietal. The base is pale-coloured, and in all respects analogous to thickened periosteum. At this part in our third specimen the diameter was 0·2 inch, tapering upwards to a terminal point. Entire length 1 inch.

As regards the mode of erection, this is evidently a muscular and voluntary act, produced by the contraction and tension of a thin sheet of muscular and aponeurotic fibres, derived from the pericranial layer. At will, and during states of excitement, the bird has merely

to move the superciliary region forwards, as in the act of scowling, and possibly lower the mandible a little, when the horn perforce must be bent forwards, and become more or less erect according to traction. Undoubtedly there is no vascular erection, as in the case of the wattle, presently to be mentioned.

I know of no other such remarkable solid cranial appendage moveable at will among the bird tribe, unless it be that of the Cotinga, (*Chasmorhynchus*) and Horned Screamer (*Palamedea*). But in my examination of *Chasmorhynchus niveus* the caruncle seemed soft and spongy compared with the foregoing, suggesting the idea of vascular erection, rather than a mere muscular act.

Instead of a double whip-like comb, which may be the true homologue, we may indeed liken the said head-organs in the Tragopan to horns; for although they have not the solidity of horn as in Ruminants, they nevertheless present an intimate structure which suggests, without being strictly, a horny constitution.

(b) *Intimate Structure of the Wattle.*

The wattle of *Ceriornis satyra* is of a totally different nature, and in most respects agrees with the same organ in other birds,—its brilliant colour, magnitude, and mobility being matters rather of degree than kind. Like the horns, it is fully developed only in the adult male. As in the case of the testes in some birds, it is periodically enlarged during the breeding-season, and then, in fact, only is in perfection.

It is simply a duplication of the skin of the throat, containing like a single papilla or a larger fold, nerves, blood-vessels, retractile and connective tissue. These increase in dimensions and complexity as the bird arrives at maturity, and under the above-mentioned conditions.

In the male Jungle-fowl, as in the domestic breed of poultry, the comb and the wattles are each a fleshy fibro-vascular organ,—the former always firm and more or less erect, the latter at all times dependent, though on occasions more fully distended with blood. In the case of the Common Turkey-Cock the wattles and caruncula dangle as loose appendages until moments of excitement, when the vascular flow towards them produces the tumid phenomena. The Tragopan's wattle differs from the preceding, inasmuch as it is thin, more membranous, and contains a double sheet of either unstriped muscular fibre or fibro-elastic tissue. The latter endows it with that wonderful retractile capacity, withdraws it out of sight, and retains it folded beneath the mandible, under ordinary circumstances, or after it has been fully expanded.

The vessels and nerves occupy chiefly the centre of the wattle. In front and behind these are the thin transparent layers of the elastic fibres and areolar tissue generally. These, again, on its two sides, superficial and deep, are covered by the upper layers of the cutis and epidermis, the blue-coloured portions coming in with the former. The vessels form a true rete mirabile, and run in nearly straight pa-

rallel lines from the root to the free extremity (see Plate LXI. fig. 14). As far as my dissection warrants me in speaking, for I labour under the disadvantage of the specimen not being injected, the arterial supply is derived from the superior cervical plexus or division of the carotid, which may be taken as such on its emergence from between the muscles of the neck. The veins are fewer, superficial, and anteriorly situate. They run forwards towards the angle of the jaw, and communicate with the jugular.

The physiology of the deflection and retraction of the wattle in the Horned Pheasant is identical with that of other vascular erectile organs. Usually the passive contraction of the fibre and elastic membrane is sufficient to retain the flaccid fold in place under the throat. During the breeding-season, however, fibre, vessels, and skin develop apace, or seem concomitantly and temporarily to increase, doubtless by a stimulus of nervous force and respective vascularity. When the period of excitement ensues, a rapid rush of blood is sent to the parts both of the gular region and head generally. The innumerable arterial channels of the rete mirabile are quickly filled; and powerful contraction of the neck-muscles follows, as may be inferred from the jerking movements of the head, mentioned in the first section. The blood thus poured into the wattle, *per saltum*, throws down the wattle, and, from the thinness and transparency of its walls, produces the magnificent scarlet tint spoken of by observers. Erection is maintained for a shorter or longer period, according as the muscles exert their pressure and prevent the return of the flow of blood. The veins, besides, being fewer in number, delay sanguineous return. The excitement having passed, relaxation follows, and the blood slacks to its normal standard. Meantime, by the contraction of the fibres within the wattle, it resumes its former place almost without an effort.

4. Résumé of the more important points.

1. The male of the Tragopan shows characteristic traits during the breeding-season, differing in several ways from allied forms—but principally noteworthy on account of elevating a pair of cranial appendages, and displaying momentarily a gorgeous membranous wattle.

2. In the female rudimentary horns, even in the young, are found.

3. The so-called horns, as likewise the wattle, *pari passu*, increase with age, and are only fully developed in the adult male at the breeding-season.

4. Even in the adult male the wattle is usually folded beneath the jaw, and almost hidden by the feathering.

5. Pseudo-horns, supraorbital region, cheek, portion of lower jaw, throat, and wattle are more or less clad with a bright blue skin, not due to venous turgescence or congestion.

6. The said coloration results from a pigment-layer and free granules situate in the dermis.

7. That which properly constitutes the horn is a black, solid, yet

exceedingly lithe conical body, which springs from the postfrontal bone. It is composed of densely packed fibro-cellular tissue, with a great quantity of pigment distributed throughout.

8. Growth of the pseudo-horn is apical; and elevation is through a musculo-aponeurotic act, not by vasculo-erectile tissue.

9. Deflection and exposure of the wattle follows from its arterial injection, being provided with a rete mirabile whose vessels run chiefly longitudinal and parallel. The occasional rich red hue is a sanguineous effect.

10. Retraction of the wattle is partially an involuntary act, the sequence of its containing abundance of fibro-elastic tissue and unstriped muscular fibre.

EXPLANATION OF THE PLATES.

Plate LX.

Fig. 1. A view of the dissected occiput and back of the neck of a young female Horned Tragopan, showing the nuchal and temporal muscles, above which are the two rudimentary horns, *h*, *h* *.

2. Profile of an adult ♂ *Ceriornis satyra*, Linn., the erectile horns, *h*, being partially exposed by the feathery crest being slightly raised.

3. An under view of the same head, with the wattle as it appears when the adjoining marginal feathering is tucked out a little way.

4. Exhibits a second stage of the mandibular region, with a full view of the contracted wattle, as the cheek- and throat-feathers are thrust widely out.

All the above figures are of natural size, and drawn from the specimen immediately after death.

5. Reduced sketch of the full facial display of the male bird, after Mr. T. W. Wood, in 'Int. Obs.' as quoted, *antè*, p. 730.

Plate LXI.

Fig. 6. Side view of the head of the second male spoken of in the text. The feathers are partly removed; the blue skin cut open on one side of the pseudo-horn brings into view the dark core beneath. Wattle seen laterally and from behind, as if injected.

7. Dissection of the posterior half of the side of the head, the skin &c. being cut away, and exposing the pseudo-horn and tissues connected therewith.

8. A mesial longitudinal section of the horn, and its blue investment of skin.

9. A transverse section of the same near its root.

10. Another cross section from about the middle.

11. A third slice, cut transversely near the tip of the horn.

12. A magnified view of the core of the pseudo-horn cut horizontally. It shows the meshwork of pigment-material and other substance of which it is composed.

13. A small portion of the elastic fibro-cellular tissue, with its pigmentary granules teased out. Shown as a microscopic preparation under a moderate power.

14. The under surface of the mandible and throat of the same ♂ Tragopan, displaying the outspread membrano-vascular wattle. On the left moiety the skin is intact, and one portion shows the natural wrinkled condition without injection; the other coloured, as if engorged with blood. On the right side of the figure the anterior layer of skin has been dissected off to display the rete mirabile when injected.

Excepting nos. 12 and 13, the figures in this Plate are represented of nearly natural dimensions.

2. Description of the younger Skull of Steller's Sea-bear (*Eumetopias stelleri*). By Dr. J. E. Gray, F.R.S. &c.

[Received June 3, 1872.]

The skull here described was obtained by Mr. Gerrard, jun., along with some skulls of animals from Japan (as, for example, the skull of the Japanese Dog); and he has no doubt that the whole collection was made in Japan. If this theory is correct, it shows that *Eumetopias stelleri* ranges from Behring's Straits to Japan.

The genus *Eumetopias* has the hinder upper grinder directed backwards, especially at the tip. This seems to be common to the Sea-bears that have the hinder upper grinder placed far back in the palate; for it is common to this genus and *Gypsophoca*. This does not seem to be the case in the skull figured by Dr. Peters under the name of *Arctophoca philippii*, which is supposed to be allied to it. I have not seen this latter skull; but in a former paper I have suggested that it may have lost its hinder pair of grinders; for Philippi has lately figured a very similar skull with a pair of grinders placed behind those figured by Dr. Peters, showing that the genus *Arctophoca* was described from an imperfect skull of *Gypsophoca*.

Fig. 1.



Eumetopias stelleri.
Sketch of head, to show the position of the ears.

The adult skull of *Eumetopias stelleri* in the Paris Museum was figured by Pander and D'Alton, but very badly, under the name of *Phoca jubata*. This skull had been most unaccountably overlooked by Nilsson and others, until Dr. Peters discovered it. The specimen we received from Mr. Gurney from Monterey was figured by me under the name of *Arctocephalus monteriensis* in the P. Z. S. 1859, pl. 72; and at the same time I described the skull of a very young specimen under the name of *Arctocephalus californianus*, which is now in the British Museum. Allen, in his paper on the Eared Seals in the Museum of Comparative Anatomy, has given a view of the underside and posterior end of the skull of a very old and of a middle-aged male Seal, and some other details; but I am not aware that a specimen in the medium stage between the adult and very young state has ever been described or figured; so that the receipt of the skull of a specimen in that state, showing the peculiarities that occur during the growth of the species, is as interesting as the description of a new species; and to illustrate these differences I have figured the sides



Fig. 2.

Side view of skull of half-grown *Eumetopias stelleri*, from Japan. B.M.

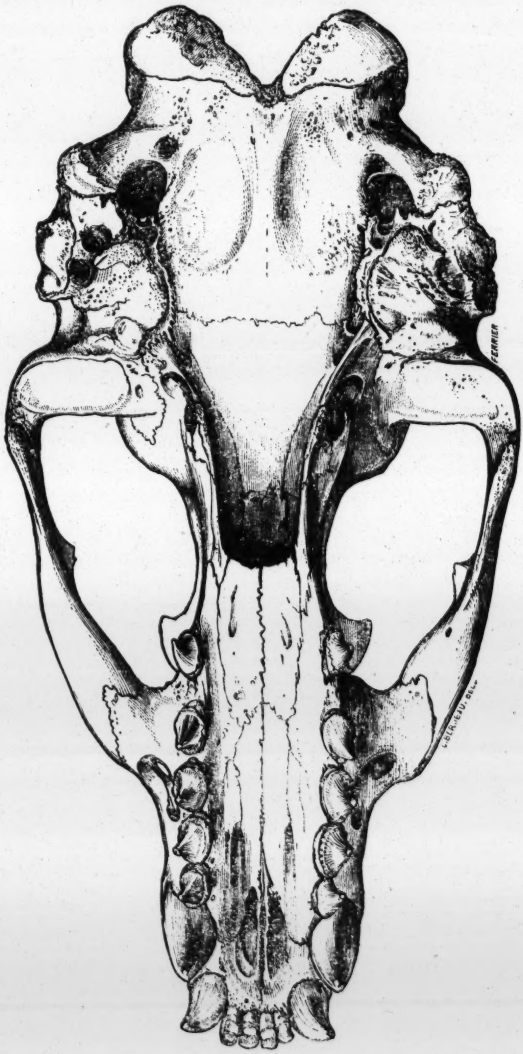


Fig. 3.

Lower surface of skull of half-grown *Eumetopias stelleri*, from Japan. B.M.

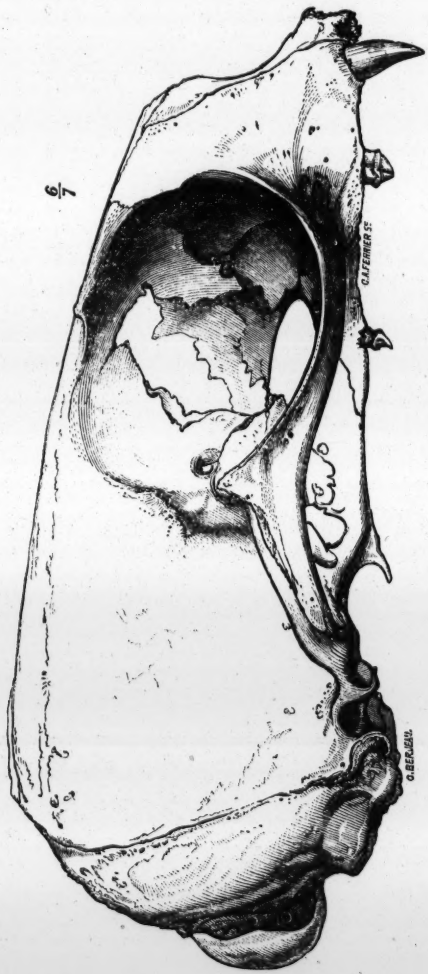
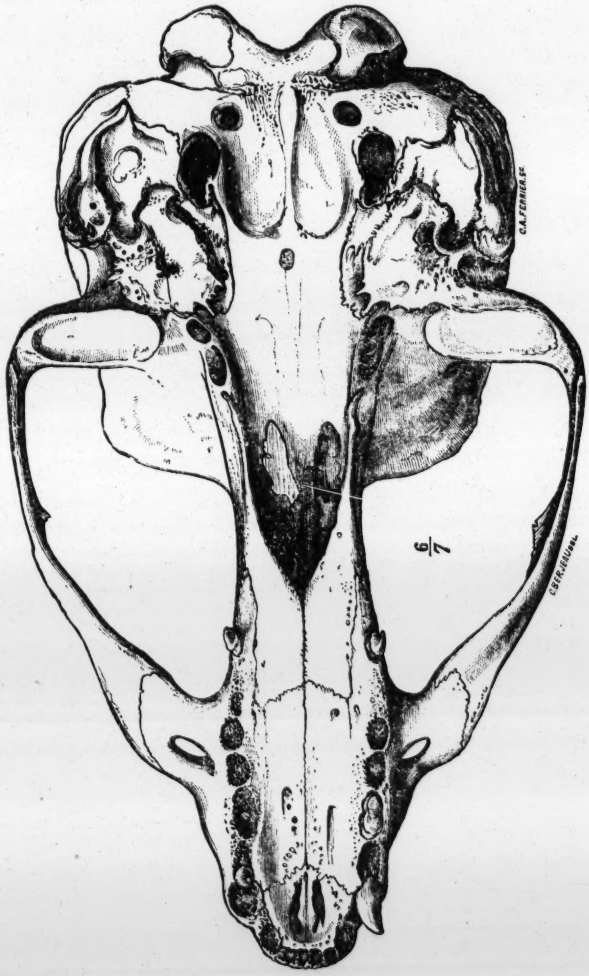


Fig. 4.

Side view of skull of very young *Eumetopias stelleri*, from California. B.M

Fig. 5.



Lower surface of skull of very young *Eumetopias stelleri*, from California. B.M.

and lower surfaces of the middle-aged Japanese and of the very young Californian skulls (see figs. 2, 3, 4, 5, pp. 738–741), confirmed by Mr. Allen's figures of the North-Pacific species. Hitherto the position of the teeth compared with other parts of the skull has been considered very little liable to vary. Indeed, in all the known species, it has been supposed that the teeth after the first change, which occurs a very short time after birth, retain their relative position during the whole of their life. This has been proved by the examination of skulls of different species and ages; and the chief difference between the two skulls in the British Museum from Monterey and Japan (?) is that the adult Monterey skull is very heavy, and very much wider (that is to say, that the width between the zygomatic arches is the same as the length from the front upper cutting-teeth to the tubercle on the hinder part of the edge of the hinder nasal opening), the palate has much greater width and is rather contracted behind, and there is a very great space between the fourth and fifth upper grinders. The hinder grinder has a small crown and a large base, consisting of two very distinct roots, the front of which is much the largest. The grinders are much more cylindrical and have more regularly conical crowns than the younger specimen.

The lower jaw is very strong and heavy, rather abruptly truncated in front, and is as high under the fifth as under the first grinder; that is to say, it is not dilated in front, but the same height the whole length. (See P. Z. S. 1859, pl. 72.)

The younger skull said to have come from Japan (figs. 2, 3) is much longer and narrower, and is peculiar for having two very large occipital condyles, which are as wide as half the width of the skull at the condyles of the lower jaw, very unlike the size of the condyles in the two nearly adult jaws figured by Mr. Allen; unfortunately this part is deficient in the adult skull from Monterey in the British Museum. The skull is light and thin, and the sutures are still visible. The width at the condyles of the lower jaw is considerably less than the length from the front cutting-teeth to the tubercles on the side of the hinder nasal opening. The grinders have elongated conical rather compressed crowns, and a distinct basal collaret; the fifth hinder one is more compressed, and only separated from the fourth by a space about as wide as the fifth tooth. This tooth has a compressed and very indistinctly divided base, very unlike the two diverging and unequal lobes of the adult skull. The lower jaw is much dilated in front, and very obliquely truncated and swollen, having a very different appearance from that of the adult animal. The grinders are rather elongate-conical, without any or only a slight lobe on the front of the collaret, the fifth or hinder grinder, with a smaller more compressed crown, having a lobe on the front and hinder edge. The canines are large, rather compressed, with a sharp cutting-edge on the hinder side; the outer upper cutting-teeth are large, nearly half the size of the canines; the crown of the grinders is elongate-conical, all these parts being much more acute and compressed than in the adult skull, the teeth becoming thicker and more cylindrical by age.

In the fœtal skull from California (figs. 4, 5) the hind upper grinder is at a considerable distance from the others, as in the very old skull in the Museum and the two adult skulls figured by Mr. Allen. The closer position of the last grinder in the younger skull from Japan may either be an individual malformation, or may be a peculiarity of the Japan Seal; this is a question that must be left for future determination.

The middle-sized skull from Japan is 11 inches long, and $5\frac{1}{2}$ inches broad at the condyles of the jaws; lower jaw $7\frac{1}{2}$ inches long. The skull of the very young is $7\frac{1}{2}$ inches long, and $4\frac{1}{2}$ inches broad.

3. Additional Notes on *Arctocephalus cinereus* and on *Gypsophoca*. By Dr. J. E. Gray, F.R.S. &c.

[Received June 10, 1872.]

I have just (June 10th, 1872) received a proof-plate that is to form part of the forthcoming volume of the 'Transactions of the New-Zealand Institute,' vol. iv. plate 12.

The Plate represents two skulls, and is inscribed "*Arctocephalus cinereus* Gray: fig. 1, adult, Milford Sound; fig. 2, young, Auckland Island."

Dr. Hector in this case has made the same mistake as I did in the 'Catalogue of the Seals and Whales,' when I described the skull of Mr. Macgillivray's Seal from North Australia as the *Otaria cinerea* of Quoy and Gaimard; but then I had never seen the real skull of the *Arctophoca cinerea*.

There is no doubt that the skulls Dr. Hector has figured are very distinct from each other, for the reasons given in my former paper. That which is figured as the adult *Arctocephalus cinereus* from Milford Sound is a true *Arctocephalus*, and apparently the same as *O. cinerea*. The young *Arctocephalus cinereus* of Hector, from Auckland Island, is evidently a *Gypsophoca* and very similar to the skull which we received from North Australia, near the tropics. The skull figured by Dr. Hector wants the last pair of upper grinders; but the cavities for the reception of their roots are well marked. The only difference that I see between this skull and the skull in the Museum from North Australia is the small size of the foramina on the side of the ossa petrosa. This adds to the difficulty about the geographical distribution of this genus. The specimen and skull in the Museum come from North Australia, near the tropics; Dr. Hector's skull from the Auckland Islands near the Antarctic circle; and Dr. Philippi's skull from the west coast of S. America, as also does Dr. Peters's *Arctophoca*, if we consider that the skull which he described had probably lost its last upper grinder, and belongs to this genus.

4. Notes on Corals from the South and Antarctic Seas. By Dr. J. E. Gray, F.R.S. &c.

[Received June 6, 1872.]

(Plates LXII.–LXIV.)

In 1846 Captain Sir James Ross sent to me four very detailed and accurate drawings of corals obtained in the southern part of the South Seas, informing me that I might figure them (after I had received descriptions of them from Mr. Charles Stokes) in the 'Voyage of the Erebus and Terror.' Three of the four drawings are named, in pencil, *Melitea australis*, n. s., *Primnoa rossii*, n. s., and *Madrepora fissurata*, n. s., most probably the manuscript names that Mr. Stokes intended to give them. I do not recognize that they are in his handwriting; I think the writing is that of my dear friend, James de Carle Sowerby; and I see one of the drawings is marked "J. S." I suppose Mr. Stokes had the specimens; and probably they were dispersed at his death, and are thus lost to science, as many specimens are that are collected during voyages of discovery made at the expense of Government, when given to private individuals, as is so frequently done. Captain Sir J. Ross and Mr. Stokes are both dead, and there is no hope of receiving any more particulars from them; and I feel that it is desirable that corals from such an out-of-the-way and rarely visited region should not be lost to science, and that I do not at all interfere with their wishes in laying them before the Society, and in having the drawings published after this long period of time. The other drawing represents a species of *Tubulipora*; but it does not bear any name, and, like the other three, is entirely destitute of any special habitat.

Mopsella australis. (Plate LXII. figs. 7–9, and Plate LXIII. figs. 10–12.)

Coral deep red, forming an expanded plane irregularly furcately branched; stem more or less sinuous; branches very unequal and acute at the tip; axis dark red-brown, longitudinally striated; articulations scarcely prominent, pale reddish; bark smooth, dark red; polypes whitish, chiefly on the sides of the branches, surrounded by a prominent ring of the bark, which is slightly sinuated on the edge.

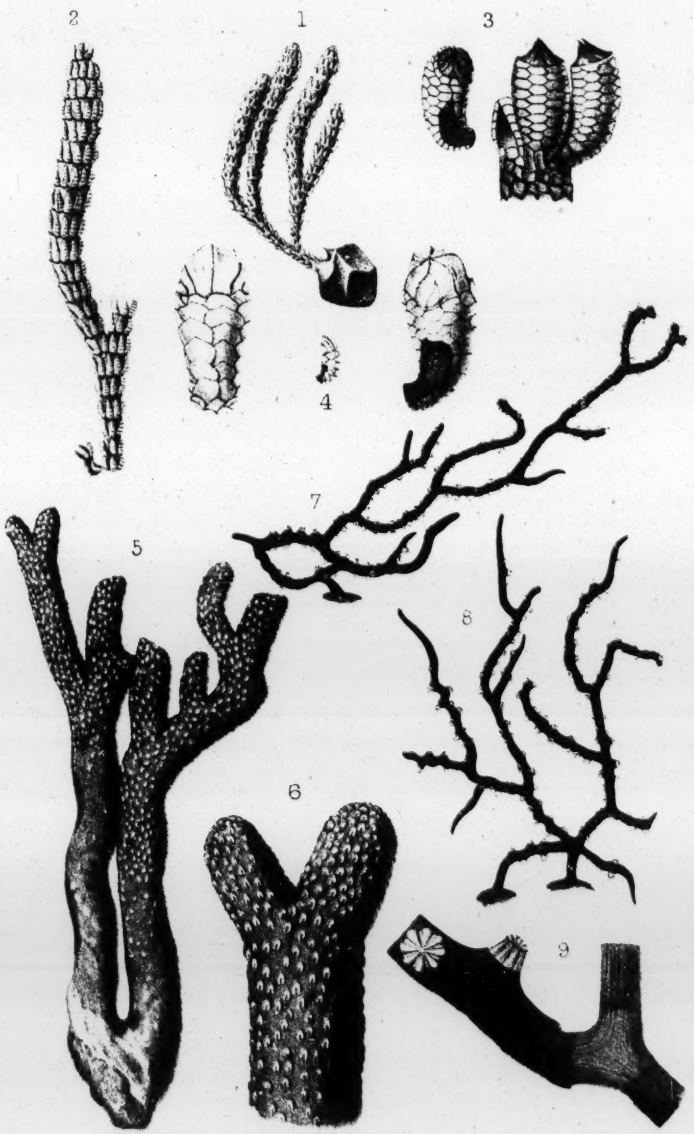
Melitea australis, n. s., Stokes, ? MS.

Hab. Antarctic Ocean (*Ross*).

The branches of the coral seem to have the faculty of forming an expanded disk, acting as a root whenever they touch a rock or other marine body.

Fannyella.

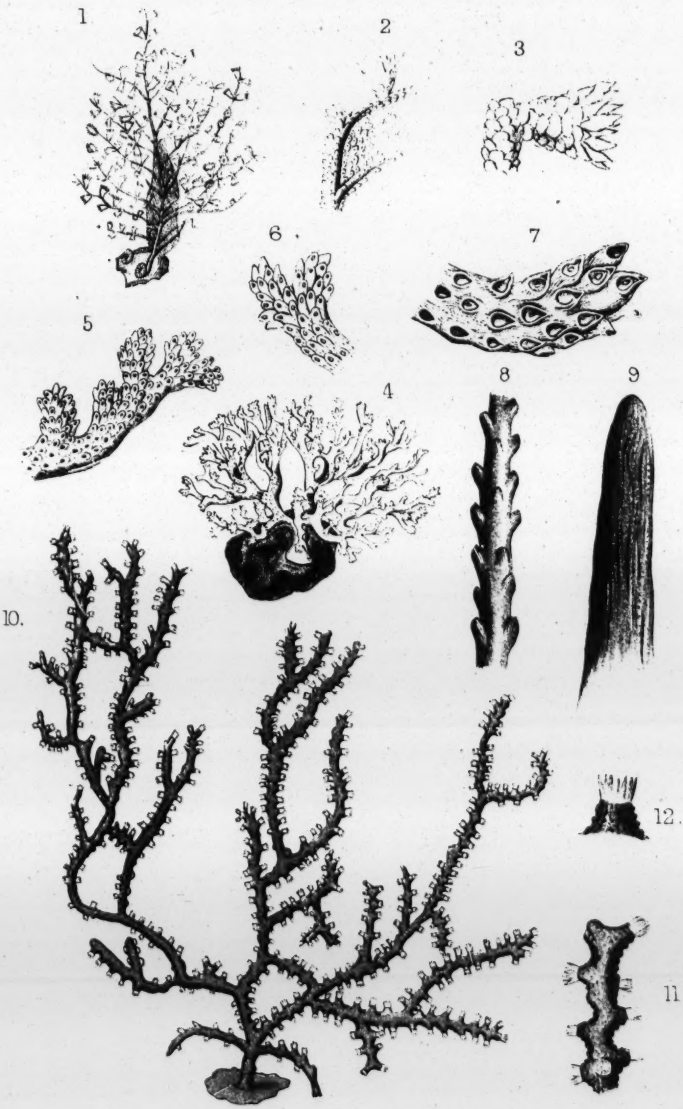
Coral slightly furcately branched; branches club-shaped, enlarging upwards, and then rapidly contracting at the tip; polypiferous cells many, in numerous close concentric rings, forming regular



G.H.Ford. Mintern Bros. Chromo lith.

NEW ANTARCTIC CORALS.

BRITISH
280673
MUSEUM

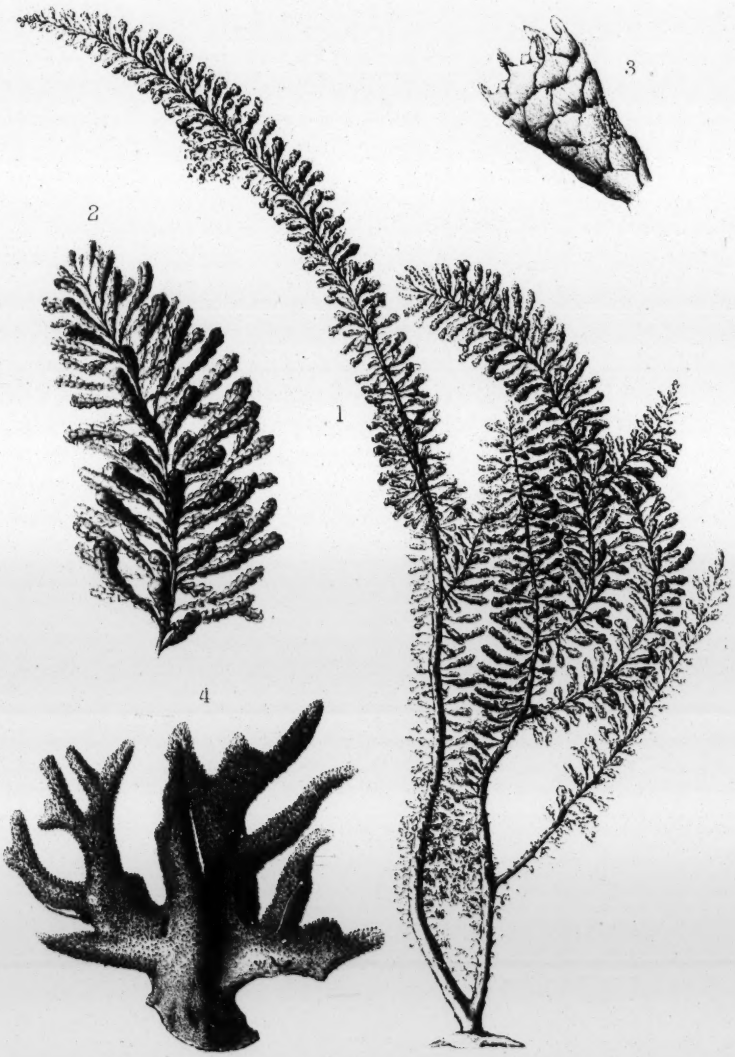


G.H. Ford.

Mintern Bros. Chromo lith.

NEW ANTARCTIC CORALS

BRITISH
280c73
MUSEUM



G.H.Ford.

Mintern Bros. Chromo lith.

NEW ANTARCTIC CORALS.

BRITISH
2800673
MUSEUM

whorls round the branches, the cells oblong, cylindrical, contracted at the base, and each covered with six longitudinal series of transverse oblong hexangular scales, truncated at top and closed with elongated more or less acute scales, converging to a point when the animal is withdrawn; axis covered with small scales.

The artist compares a magnified figure of the polype-cells with the cells of the *Primnoa lepadifera* (Plate LXII. fig. 4), to show the difference in the form of the scales with which the cells are covered and closed, the latter being more unequal and blunt.

FANNYELLA ROSSII. (Plate LXII. figs. 1–3).

Primnoa rossii, n. s., Stokes, ? MS.

Hab. Antarctic Ocean (*Ross*).

I have dedicated this genus to Mrs. Hooker, who took great interest in the results of Captain Ross's Antarctic voyage. I have named it in the same manner as Mr. Busk did *Nellya* and I *Emmia*, after ladies who were both friends of Mrs. Hooker.

ERRINA FISSURATA. (Plate LXII. figs. 5 & 6.)

Coral subcylindrical, pale reddish brown, forked at the base, each branch elongate; one irregularly forked in the upper part, the other with a branch on the outer side, which appears to have been irregularly forked on its upperside; the apical branches subcylindrical, rounded at the end; cells mostly prominent, acute, with a central slit on the outer side, and with some scattered larger circular pits, without any raised edge, chiefly on the centre line of the branch.

Madrepora fissurata, n. s., Stokes, ? MS.

Hab. Antarctic Ocean (*Ross*).

This figure is marked "J. S." in the same colour as the coral is painted, doubtless the initials of the artist. The figure is about 4 inches long.

TUBULIPORA NIVALIS. (Plate LXIII. figs. 4–7.)

Coral branched; branches ascending, repeatedly branched, with a number of short lobes all on the upperside, white.

Hab. Antarctic Ocean, growing on a pebble.

Mr. Kent thinks this coral belongs to the genus *Porina*, and is allied to the fossil species figured in D'Orbigny's 'Paléontologie Française: Terrains Crétacés,' plate 714. figs. 8–10.

Captain Henry Toynbee, of the Meteorological Office, has brought to the British Museum two corals which were obtained by Capt. James Clark, R.N.R. (now Captain of the ship 'Western Empire'), when dredging on a calm day off Burwood Bank, lat. 54° 27′ S., long. 59° 40′ W., in 45 fathoms, on the 1st January, 1872, consisting of a fine specimen of *Porella* and a specimen of *Thouarella antarctica*. Captain James Clark, through the kind intervention of Captain Toynbee, has presented these beautiful specimens to the British Museum.

THOUARELLA ANTARCTICA. (Plate LXIV. figs. 1–3.)

Coral branched, of bright yellow colour; branches few, of very unequal length, of elongated cylindrical shape, each being surrounded on all sides by very numerous club-shaped branchlets, each ending in a polype. The branches of unequal length, and the branchlets, make it like a cylindrical bottle-brush which is rather attenuated towards the tip.

Primnoa antarctica, Valenc. Voy. Ven. t. xii. f. 2.

Thouarella antarctica, Gray, Cat. Lithophytes in B.M. p. 45; Ann. & Mag. Nat. Hist. 1872, ix. p. 482.

Hab. Falkland Islands, on Burwood Bank, in 45 fathoms, very abundant (*Capt. James Clark, R.N.R.*).

This species was first described by M. Valenciennes in the 'Voyage of the Venus,' t. xii. f. 2, from a specimen found by Admiral Dupetit Thouars. The specimen was from the Falkland Islands. The specimen figured is small and very imperfect, and would scarcely give an idea of this beautiful coral, which Captain Clark found very abundant. The specimen in the Museum has one branch 18 inches long, and gives quite a different idea from M. Valenciennes's figure. Mr. Carter has kindly examined the cells under the microscope, and observes that they are formed of oval imbricated scales, lacerated on the edge, with radiating lines and scattered circular dots of a calcareous secretion. Unfortunately these scales are very deciduous.

PORELLA ANTARCTICA. (Plate LXIV. fig. 4.)

Coral fan-shaped, thick, rather compressed, divided into several branches, some simple and gradually tapering, the others more or less furcately divided; of a bright crimson colour, with the more compressed forked tips paler, whitish.

Porella antarctica, Gray, Ann. & Mag. Nat. Hist. ix. p. 482, 1872.

Hab. Falkland Islands, on Burwood Bank, lat. 54° 27′ S., long. 59° 40′ W., in 45 fathoms (*Capt. James Clark, R.N.R.*). B.M.

Nearly allied to *Porella cervicornis* of the British seas.

Dr. Joseph Hooker, who accompanied Ross during his Antarctic voyage, made a series of the drawings of the animals which they observed. No. 255 of these drawings represents a new species of *Primnoadæ*, which I described in the 'Catalogue of Stony Corals in the British Museum,' p. 45, under the name of

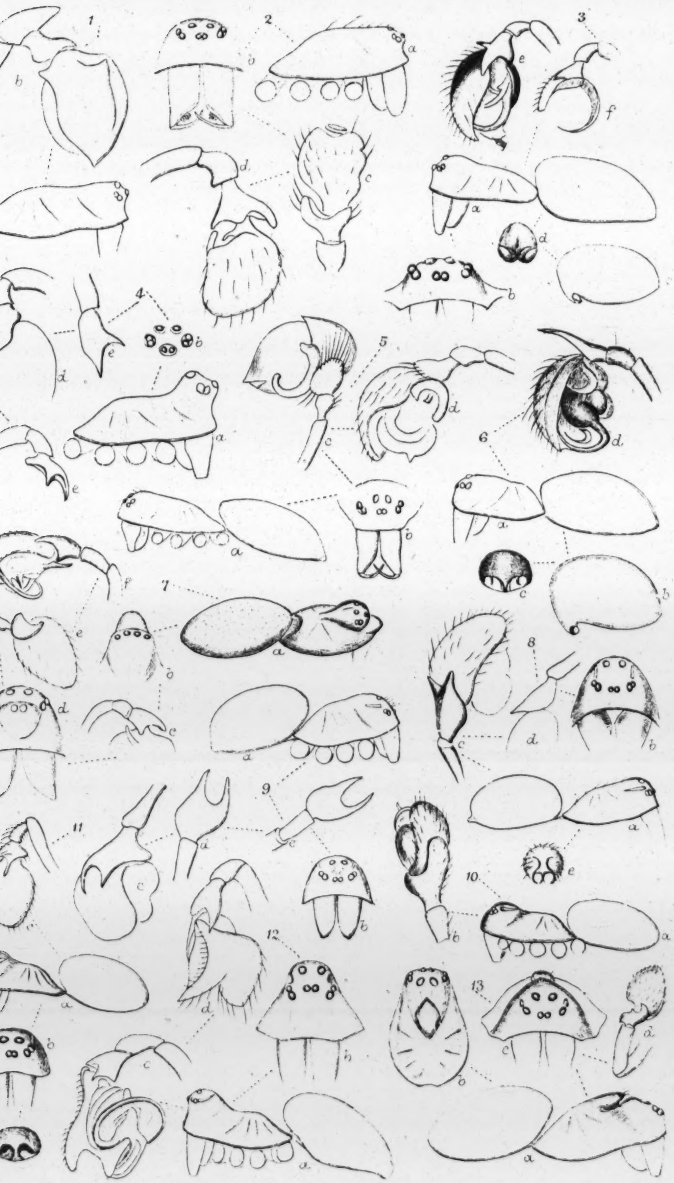
HOOKERELLA PULCHELLA. (Plate LXIII. figs. 1–3.)

Hookerella pulchella, Gray, Cat. Lith. B. M. p. 45.

The coral was 2 inches high, and was obtained in the Antarctic Ocean.

The coral is erect, fan-shaped, pinnate; branches simple, nearly parallel; bark and polype-cells covered with large imbricate scales; polype-cells bell-shaped, contracted at the base, open and fringed, with larger scales at the mouths, in close series on the upper and lower sides of the branches, opposite to each other.





New Species of Erigone

PRÉFECTURE DE LA SEINE
280073



New Species of Erigone.

SYDELLA.

Coral erect (?), straight, cylindrical, rather tapering, covered with cylindrical cells, tapering at the end and placed in four rather irregular longitudinal series, covered externally with red fusiform spicules, placed very close together in a longitudinal direction. Polypes completely retractile, leaving a small rounded end to the cell when retracted.

Only known from the figure of Dr. Hooker, which apparently represents the apex of a branch, and does not show any internal axis if one exists.

This figure is here accurately copied.

SYDELLA AUSTRALIS. (Plate LXIII. figs. 8 & 9.)

Hab. Australia, Sydney (*Dr. Hooker*).

Mopsella australis.—There is a beautiful figure in Dr. Hooker's drawings of a coral which I believe is the same as the one here described; but it is much larger and the polypes much closer: there is no representation of the axis. No habitat is mentioned. This drawing is copied, with the rest of Dr. Hooker's drawings, on Plate LXIII.

EXPLANATION OF THE PLATES.

PLATE LXII.

Figs. 1–3. *Fannyella rossii.*
4. *Primnoa lepadifera*, polype-cell from North Sea for comparison.
5 & 6. *Errina fissurata.*
7–9. *Mopsella australis.*
(All from Mr. Stokes's drawings.)

PLATE LXIII.

Figs. 1–3. *Hookerella pulchella.*
4–7. *Tubulipora nivalis.*
8 & 9. *Sydella australis.*
10–12. *Mopsella australis.*
(All from Dr. Hooker's drawings, except figs. 4–7, which are from Mr. Stokes's drawings.)

PLATE LXIV.

Figs. 1–3. *Thouarella antarctica.*
4. *Porella antarctica.*
(From specimens in the British Museum.)

5. Descriptions of Twenty-four new Species of *Erigone*. By the Rev O. P. CAMBRIDGE, M.A., C.M.Z.S.

[Received June 4, 1872.]

(Plates LXV. & LXVI.)

With one exception, the Spiders here described, and supposed to be new to science, are European, the single exception being one found near Alexandria, Egypt (*Erigone alexandrina*). One species only (*E. prominula*) has been found also in England; of the remainder two were found at Rome, one in the neighbourhood of Paris, one at

Corfu, one on the Styrian Alps, and the rest near Nuremberg in Bavaria.

It is almost impossible to give, within any reasonable limits, such descriptions of these minute Spiders (many of which are exceedingly nearly allied to others already described) as will make them easily determinable from description alone; magnified figures are therefore given of those portions of their structure upon which, *par excellence*, specific distinctions are based—that is, the form of the cephalothorax and the form and structure of the palpi and palpal organs of the adult males. Wherever possible, the form of the genital aperture in the females is also figured. There are, apart from their minute size, peculiar difficulties in the determination of Spiders of the genus *Erigone* (taking that to include most of *Neriene*, Bl., and all of *Walckenaëra*, id.); but as I am engaged at the present time in collecting materials for an attempt to recast the arrangement of the numerous species contained in it, I do not propose here to enter upon those difficulties, further than to remark that every fair description, and all good figures of the above noted portions of structure of any species supposed to be new to science, will most materially assist towards a complete and satisfactory monograph upon the whole group, which now includes several hundred species.

ERIGONE (NERIENE, Bl.) ARIETANS, sp. n. (Plate LXV. fig. 1.)

Male adult, length $\frac{1}{16}$ of an inch.

The *cephalothorax* is glossy and of a deep blackish-brown colour, margined with black, the normal grooves and indentations being indicated by yellow-brown; the *legs* are orange-yellow, and the *abdomen* black; the *palpi* are of a dull greenish-yellow colour, the radial and digital joints strongly suffused with black. The fore part of the caput, where the eyes are seated, is a little prominent; the clypeus is impressed in the middle, but prominent at the lower margin, and its height equals two thirds of that of the facial space; the profile line of the cephalothorax is a little depressed near the junction of the caput and thorax.

This species is closely allied to *Neriene subtilis* (Cambr.), which it resembles in the form of the digital joint of the palpus; but the form of the cubital joint is very peculiar, and at once distinguishes it from all other species known to me. This joint is produced to near double its length in front, in an obtusely pointed prominent form; the radial joint is also slightly produced at its extremity, rather on the outer side; the digital joint is large, with a small pointed prominence at its base on the inner side, and a large subconical one near the middle on the outer side; the palpal organs are prominent and complex, with corneous spiny processes.

A single example found by Dr. L. Koch at Nuremberg, and sent to me for examination.

ERIGONE (NERIENE, Bl.) INCOMTA, sp. n. (Plate LXV. fig. 2.)

Male adult, length $\frac{1}{18}$ of an inch.

The *cephalothorax* is of a deep shining black-brown colour, and

has a longitudinal central row of bristly hairs directed forwards, the two hinder ones being the longest and widest apart. The caput and thorax are confluent, and the normal grooves and furrows are not strongly defined; the height of the clypeus exceeds half that of the facial space, and it is rather strongly impressed just below the eyes, and prominent near the lower margin.

The *eyes* are seated on tubercles, those on which the lateral pairs are placed being strong; they are not very unequal in size; those of the hinder row are about equidistant from each other; each eye of the hind central pair is separated from that one of the fore central pair opposite to it by a space not much greater than the diameter of the former. The *legs* are of moderate length, 4, 1, 2, 3; their colour is yellow, the femora and tibiæ being bright orange; and they are furnished with hairs, some of which, on the uppersides, are erect.

The *palpi* are not very long; they are of a greenish-yellow colour suffused with brown, especially on the radial and digital joints; the cubital joint is short, strong, and somewhat gibbous in front; the radial joint is small at its junction with the cubital, but enlarges quickly, and is produced at its outer extremity into a strong, obtusely ending, and slightly bent apophysis; it is also rather prominent (or produced), both at its hinder and inner extremities; the digital joint is large, somewhat truncate at its extremity, beneath which the palpal organs have a strong coiled and rather prominent black spine connected with them; and in contact with it there is some semitransparent whitish membrane. The *sternum* is heart-shaped, convex, furnished with a few bristly hairs, and similar in colour to the cephalothorax. The *maxillæ* and *labium* are normal in form, and of a rather lighter colour than the sternum.

The *abdomen* is rather large, of an oval form, and moderately convex above; it is glossy, and of a jet-black colour, slightly rugulose, and sparingly furnished with short, strongish hairs; some minute ones have a golden lustre in some lights when in spirit of wine. The *falces* are strong, straight, and nearly vertical; they exceed in length the height of the facial span, and have a cluster of fine sharp teeth towards their inner extremities.

The female is rather larger than the male, and has the abdomen much more convex above; but in colour and other general characters the two sexes are similar.

An adult example of each sex, found near Nuremberg, was received for examination from Dr. L. Koch. It is very nearly allied to *Neriene saxatilis* (Bl.), but may be easily distinguished by the form of the radial joints of the palpi, and by the coiled spine connected with the palpal organs; from *Erigone sundevallii* (Westr.) it may be at once distinguished by the absence of spines beneath the legs of the first two pairs.

ERIGONE (NERIENE, Bl.) FORENSIS, sp. n. (Plate LXV. fig. 3.)

Male adult, length 1 line.

This Spider is of ordinary general form and structure. The

clypeus is impressed immediately below the eyes, and slightly prominent above the falces, and its height rather exceeds half that of the facial space; the lateral pairs of eyes are seated on strongish tubercles, and the foremost one of each appears to be the largest of the eight; the space between those of the hind central pair is very slightly smaller than that between each and the hind lateral on its side; those of the fore central pair are contiguous to each other, and each is the same distance from the hind central on its side as the hind centrals are from each other. The colour of the cephalothorax and falces is yellow-brown, and that of the legs and palpi is yellow. The legs are furnished with hairs, and are not very strong, but moderately long; their relative length is 1, 4, 2, 3. The palpi have the radial joint of peculiar and characteristic form; it is stronger than the cubital, and has a small, prominent, sharp spine-like apophysis from its outer extremity; its fore extremity is produced into a slightly curved, strongish, obtusely pointed apophysis; its inner extremity is protuberant and strong, and from its hinder extremity there issues a strong, longish, curved, tapering, sharp-pointed, spiny apophysis, which, curving over the palpal organs, looks at first as if it were part of them; but on closer inspection from different points of view, its union with the radial joint is plainly perceptible: the digital joint is of somewhat irregular form, having a kind of flat-sided lobe near its base, the flattened side directed outwards; this peculiarity of structure reminds one of that of the digital joint of *Neriene subtilis* (Cambr.), *N. conigera* (id.), and others: the palpal organs are well developed, rather complex, and are surrounded beneath by a long, slender, black spine, curved in a circular form. The abdomen is of a dull blackish hue, tinged with olive, and somewhat palest on the upperside, along which, towards the hinder part, are visible (in spirit of wine) some fine transverse angular lines, or chevrons. An adult female taken under the same stone as the male, resembled it in colour and other general characters; but the height of the clypeus was less, both positively and proportionally, and the epigyne was prominent, but not much so: possibly this may not be the female of the male above described.

A single example of each sex was found by myself under a stone, among the ruins of the Forum at Rome, in February 1865.

Erigone (Neriene, Bl.) prominula, sp. n. (Plate LXV. fig. 4.)

Male adult, length $\frac{1}{17}$ of an inch.

The *cephalothorax* is of a deep black-brown colour, margined with black; the caput is rather prominent and produced; the summit of the elevated part slopes slightly and flattishly forwards, and the occiput rather abruptly backwards. The height of the clypeus (which is impressed at the middle, but prominent at the lower margin) considerably exceeds half that of the facial space; the normal furrows and indentations are well marked.

The *eyes* are in four pairs, forming a transverse oval, and occupying the whole extremity of the cephalic prominence; those of the

hinder pair are on the posterior margin of the prominence, and are separated from each other by about the length of an eye's diameter; those of the foremost pair are close together on the fore margin; those of the lateral pairs are seated obliquely, each hind lateral eye being removed about an eye's diameter from that of the hinder pair on its side; so that these four form a strongly curved row, and are equidistant from each other. All are seated on strongish tubercles, and are dark-coloured and indistinct.

The *legs* are moderate in length and strength, of a yellow colour, tinged with orange; their relative length is 4, 1, 2, 3; and they are furnished with hairs, of which a few have a semispinous character and are nearly perpendicular.

The *palpi* are paler and duller in colour than the legs, the digital joint and a portion of the radial are brown; the cubital and radial joints are very short, the latter being the stronger of the two; it is slightly and obtusely produced behind, and at its fore extremity are two pointed apophyses, one in front the longest and strongest, the other, of the nature of a sharp prominent tooth, on the outer side. The *abdomen* is of a broadish and somewhat flattened oval form; its colour is deep black; it is clothed perceptibly with hairs, and projects considerably over the base of the cephalothorax.

A single example, captured at Nuremberg by Dr. L. Koch, by whom it was forwarded to me for examination. In the form of the cephalothorax and the position of the eyes it bears some considerable resemblance to the genus *Theridion*. Among its near congeners it seems to be allied to *Walckenaëra humilis* (Bl.); the form of the cephalothorax and the radial joints of the palpi easily distinguish it from any other yet described species. Other examples have since been captured at Newhaven, Sussex, by M. Eugène Simon, in the spring of 1871; these were found on furze bushes, among the shoots covered with bloom.

ERIGONE (NERIENE, Bl.) INCONSPICUA, sp.n. (Plate LXV. fig. 5.)

Male adult, length $\frac{1}{13}$ of an inch.

The cephalothorax, falces, maxillæ, and labium of this species are of a yellow-brown colour, the sternum being suffused with blackish; the legs are tinged with orange, and the abdomen is of a dull olive-greenish brown. It is closely allied to *Linyphia? microphthalma* (Cambr.), both in size, general form, and structure, but may be distinguished by the larger size of the eyes, a difference of structure in the palpal organs, and also by the armature of the legs; in the present species the legs are furnished with no *spines*, properly so called, these being represented by bristles. It also bears considerable resemblance to *Linyphia decens* (Cambr.); but that species differs remarkably in the colour and clothing of the abdomen.

The radial joints of the *palpi* are produced at their extremity in front, in a rounded form, near which, close to the upper fore margin, is a single rather conspicuous series of bristly hairs directed forwards, and on the outer side are also some longer ones of the same nature; close to the outer side of this joint the palpal organs have a circu-

larly curved, strong, corneous process, from within the curvature of which there issues from these organs a small, black, pointed projection. The two hind central eyes are nearer together than each is to the lateral eye of the same row on its side.

This Spider is of one of those obscure species which occupy the debatable ground between *Linyphia* and *Erigone*. To both of these genera it is allied by strong characters; but, as it appears to me, it is more strongly linked to the latter than to the former. Probably it should form one of the genus *Bathyphantes* (Menge); but the distinctions between this and *Erigone* (Westr.) have not been yet sufficiently characterized, although undoubtedly its special characters are widely different from those of some other groups of *Erigone*. A single example was received for examination from Dr. L. Koch, by whom it was captured at Nuremberg.

ERIGONE (NERIENE, Bl.) ROMANA, sp. n. (Plate LXV. fig. 6.)

Male adult, length 1 line.

The colour of the cephalothorax and sternum are deep brown; the abdomen is black, and the legs are orange yellow-brown; the rest dull brown, with a yellowish tinge. In general form and structure this Spider is of an ordinary type; the cephalothorax is rather short, and less flattened behind than in many others; the clypeus is equal in height to half that of the facial space, and is very slightly impressed immediately below the eyes: the eyes are rather prominent, being seated on tubercles; they are in the ordinary position, and not very unequal in size; those of the hinder row (which is longest and most curved) are equally separated, and each of those of the fore central pair (which are contiguous to each other) is separated from the hind central on its side by a space equal to that which separates those of the hind central pair; the eyes of each lateral pair are obliquely placed and contiguous to each other. The *legs* are moderately long and strong, and are furnished rather thickly with hairs, among which are some very slender, diaphanous, erect, spine-like bristles. The *palpi* are moderately long and not very strong; the cubital is longer and stronger than the radial joint, and slightly bent: the radial has its upper extremity produced into a long, not very strong, nearly straight, tapering apophysis, equal in length to both radial and cubital joints together, and its point, which is sharp (when looked at sideways) and corneous, bends a little downwards; this apophysis projects over the digital joint very prominently: the digital joint is large, and the palpal organs are well developed and rather complex; a strong, circularly coiled, black spine issues from a roundish corneous lobe on their outer side, and a smaller curved spine is visible within the coil of the former. The falces are strong, rather long, and vertical. The abdomen is oval, black, and glossy, and nearly double the length of the cephalothorax. The female resembles the male in general characters and colour. The epigyne is prominent, and, when looked at in profile, projects visibly beyond the surface of the abdomen, and with a backward direction; the genital aperture is also characteristic.

The form of the radial joint of the palpus in the male is very strongly characteristic of this species, and affords an easy character by which to determine it. An adult example of each sex were found by myself under stones in the baths of Caracalla at Rome, in February 1865.

ERIGONE (NERIENE, Bl.) SILA, sp. n. (Plate LXV. fig. 7.)

Male adult, length $\frac{1}{15}$ of an inch.

The colour of this very distinct species is yellow-brown, the legs and palpi being pale yellow, tinged with dull orange. In its general form and structure it is of the ordinary type; but the strongest distinct character is furnished by a prominent, somewhat oval, prow-like projection of the upper part of the clypeus, just beneath the eyes; the profile line of the thorax behind the eyes is rather hollow; and the hind slope is abrupt. The eyes are in four pairs, just above and behind the clypeal prominence, and do not differ greatly in size; those of the fore central pair are smallest, and rather difficult to be distinguished; those of the hind central pair are rather nearer to each other than each is to the hind lateral on its side; those of each lateral pair are placed obliquely, and are contiguous to each other. The *legs* are rather short, moderately strong, and furnished sparingly with hairs only.

The *palpi* are short; the radial and cubital joints are of about equal length, the former being much the strongest, spreading outwards in a somewhat obtusely angular form, and produced in a rather curved, blunt-pointed form at the extremity on the upperside; the digital joint is rather large; and the palpal organs are highly developed and tolerably complex; a longish, black, curved, sharp-pointed spine issuing from near their extremity on the outer side forms a bold sweep round them; there are also several other spiny corneous projections in connexion with these organs. The abdomen is oval, rather large, and of a somewhat flattened form; and its upper surface is covered by a coriaceous, finely punctured integument very sparingly furnished with short fine hairs.

An adult male of this Spider was received from Dr. L. Koch, by whom it was found near Nuremberg, Bavaria.

ERIGONE (WALCKENAËRA) PALLENS, sp. n. (Plate LXV. fig. 8.)

Male adult, length $\frac{1}{13}$ of an inch.

The whole of the fore part of this Spider, including the legs and palpi, are of a brightish but pale yellow-brown colour, the abdomen being of a sooty drab, tinged with yellow-brown.

The general form and structure is sufficiently ordinary, resembling nearly that of *E. scabricula*, Westr. (*W. aggeris*, Cambr.), and others; but it may be distinguished from others having a somewhat similar conformation of the cephalothorax by its colour, as well as by the structure of the palpi.

The fore part of the caput has scarcely any distinct elevation, but is rather bluff and rounded; the height of the clypeus is scarcely that of half the facial space: the eyes are in the ordinary position,

and in the usual four pairs; those of the fore central pair are very minute and contiguous to each other, and are in a straight line with the foremost eyes of the two lateral pairs, which are slightly the largest of the eight; those of the hinder (or upper) pair are separated by rather more than an eye's diameter from each other; a long, narrow indentation, of a tapering form, runs backwards from a little above and behind each hinder eye of the two lateral pairs.

The *legs* are moderately long, rather short, and are furnished with hairs and a few slender erect bristles. The *palpi* are short; the radial is much stronger, though about the same length as the digital joint; the former has its extremity on the upperside divided (or, as it were, cleft), leaving two points; that towards the outer side is the strongest and most prominent, while the inner one adheres more closely to the digital joint. These two points give the fore extremity of the radial joint a strongly notched appearance. The palpal organs are well developed and prominent, but not very complex; they consist chiefly of a large, somewhat globular, shining, corneous lobe, with the fore part of which is connected a small, black, somewhat curved prominent spine.

The female resembles the male, except in the rather less convexity of the caput, the eyes being thus more closely grouped, though relatively in the same position; the form of the sexual aperture is characteristic, and may be understood better from the figure in the engraving than from any description that could be given.

Adults of both sexes were received from Dr. L. Koch, by whom they were captured in the neighbourhood of Nuremberg.

ERIGONE (WALCKENAËRA) BISCISSA, sp. n. (Plate LXV. fig. 9.)

Male adult, length $\frac{1}{18}$ of an inch.

The cephalothorax, falces, maxillæ, and sternum of this species are of a yellow-brown colour, the *legs* and *palpi* being yellow-brown, tinged with red. The *abdomen* is of a short oval form, very sparingly furnished with hairs, and of a dull (though shining) greenish sooty-black colour. The *caput* is not elevated, but is simply rounded off on all sides, the occiput being evenly confluent with the thorax; the normal grooves and furrows are indistinct; two longish, narrow, slightly curved, longitudinal indentations run backwards from between the lateral and hind central pairs of eyes; on the sloping space between the eyes of the fore and hind central pairs are some short hairs; the height of the clypeus appeared to be less than half of that of the facial space; the eyes of the hind central pair are about one eye's diameter from each other; the fore lateral eyes are the largest of the eight, and are in a straight line with those of the fore central pair, which are very small, indistinct, and contiguous to each other, and each is separated from the fore lateral eye on its side by a space equal to its own diameter.

The *legs* are moderately long and strong, their relative length 4, 1, 2, 3, and furnished with hairs.

The *palpi* have the radial and cubital joints very nearly of equal length; but the former is greatly the strongest; it is produced ob-

tusely behind, and to a considerably greater extent in front, where it terminates with two points or cusps; the outer one of these is the most prominent, largest, strongest, and slightly the longest; the inner one is curved, and adheres more closely to the surface of the digital joint; these cusps give the fore extremity of the joint a deeply emarginate appearance; and the colour of the produced portions is deep brown: the digital joint is large and dark brown. The palpal organs are prominent, but not very complex, with a short, strong, prominent, and slightly curved, black, spiny point at their extremity.

An adult male of this Spider was sent me for examination by Dr. Koch, by whom it was found at Bayreuth, in Bavaria. It is allied to *Walckenaëra ignobilis* (Cambr.), and very nearly to *Erigone insecta* (L. Koch): but differences in the structure of the palpi will serve, with other specific characters, to distinguish it.

ERIGONE (WALCKENAËRA) GRÆCA, sp. n. (Plate LXV. fig. 10.)

Male adult, length $\frac{3}{4}$ of a line.

The colours of this small species are those common to very many others. Cephalothorax, falces, labium, maxillæ, and sternum deep yellow-brown and glossy. Legs dull pale yellowish brown. Abdomen of a rather sooty brown-black. Its general form is very nearly that of *Walckenaëra aggeris* (Cambr.), but it is of rather a more slender build: the eyes are in the ordinary four pairs; the foremost eyes of each of the two lateral pairs are the largest, and are in a straight line with those of the fore central pair: the height of the clypeus is equal to one half that of the facial space; and from behind, and a little above, each lateral pair of eyes a long and rather strong indentation runs backwards and defines the cephalic elevation. The *legs* are rather long and slender, and furnished only with hairs. The *palpi* are similar in colour to the legs; they are not very long nor strong; the radial is much stronger than the cubital joint, and is broadly and obtusely produced at its upper fore extremity, a little towards the inner side. In this it differs from all others with a somewhat similar form of cephalothorax yet known to me; the digital joint is rather small, and of a roundish oval form; the palpal organs are not very complex, consisting chiefly of a roundish corneous lobe, at the extremity of which, beneath the fore margin of the digital joint, is a blackish, curved, pointed spine.

Two adult males of this little Spider were found by myself beneath stones on the island of Corfu, in the spring of 1865.

ERIGONE (NERIENE) ALEXANDRINA, sp. n. (Plate LXV. fig. 11.)

Male adult, length $\frac{3}{4}$ of a line.

The cephalothorax of this Spider is of ordinary form, very like that of *Neriene pygmæa* (Bl.), *N. latebricola* (Cambr.), and others; the clypeus is full and rounded, and its height equals half that of the facial space; the occiput is slightly gibbous, and a strong indentation runs backwards from immediately behind each lateral pair of eyes; it is of a bright yellow-brown colour, the normal grooves and indentations marked by dusky, ill-defined lines. The eyes are not very unequal in

size; they are in the usual four pairs, forming, when looked at from the front, two rows, the upper one longest and strongly curved, the lower one nearly straight; the space between the two of the hind central pair is rather less than that between each and the hind lateral on its side; those of the fore central pair are the smallest of the eight, and are contiguous to each other; and those of each lateral pair are placed obliquely and contiguous to each other. *Falces* strong and massive, and similar in colour to the cephalothorax. *Legs* moderately long and strong; their relative length is 4, 1, 2, 3; those of the fourth pair in the female appeared to be longer in proportion than those of the male; they are furnished with hairs, and are not very dissimilar in colour to the cephalothorax, but are more strongly tinged with reddish orange colour. The *palpi* are short, moderately strong, and similar in colour to the legs; the radial is equal to the cubital joint in length, but much stronger, and has a small, nearly straight, tapering apophysis near the middle of its fore extremity; and its outer extremity is also a little produced, giving it rather a pointed appearance when looked at from the front; the digital joint is small and of an oval form; and the palpal organs are not very complex, though well developed. The sternum is heart-shaped, glossy, very convex, and of a dark yellow-brown colour. The abdomen is oval and moderately convex above; it is of a dull sooty brown colour; and when in spirit of wine some examples show various pale transverse lines on the hinder part of the upperside.

The female resembles the male, except in being larger; and the genital aperture is of characteristic form.

Adults of both sexes were found by myself among water-weeds in a swamp near Alexandria, Egypt, in 1864.

ERIGONE (WALCKENAËRA, Bl.) SIMONII, sp. n. (Plate LXV. fig. 12.)

Male adult, length 1 line.

The cephalothorax of this very distinct species is of a yellowish red colour; the legs, palpi, falces, and maxillæ yellow; the sternum somewhat darker; and the abdomen (which is rather large and considerably convex above) is of a bright brick-red, finely mottled and marked above with paler spots and lines, not very visible except in spirit of wine. The *caput* is a little elevated; the hinder slope of the elevation is long and gradual, forming a rounded occiput. The height of the clypeus is nearly two thirds of the facial space; and it is slightly impressed in the middle, forming a curved profile line; a deep longitudinal excavation or indentation, of a tapering form, runs backwards from each lateral pair of eyes.

The *eyes* are seated on black spots on the fore slope of the elevation of the caput; those of the hinder pair are near the summit, those of the fore central pair on the fore margin; these are separated from those of the hinder pair by the same space that separates these last from each other; those of the lateral pairs are placed obliquely, and a little below the level of the fore centrals, when looked at from the front.

The *legs* are long and slender; their relative length 4, 1, 2, 3, those of the fourth pair being perceptibly the longest; they are furnished sparingly with hairs; each genual joint has a short black bristle on its fore side; and another similar one is placed about the middle of the uppersides of the tibiæ.

The *palpi* have the cubital joints clavate, short, and bent downwards; the radial is of about equal length with the cubital, and is produced at its extremity into two short points, one on the inner, the other on the outer side, forming a strongly emarginate margin: the digital joint is large and of an irregular and unusual form; it has a large, sharp-pointed, nearly concave prominence towards the extremity on the outer side, and another at its base on the same side, whose extremity is almost in contact with the fore extremity of the radial joint; these prominences run together; and the upper line of communication is black and fringed with short strong bristly hairs: the palpal organs are very prominent, well developed and complex; a fine black spine issues from near their fore extremity, and curves backwards and inwards with a large, prominent, circular sweep. The *sternum* is similar in colour to the abdomen. The *falces* are rather long, moderately strong, straight (?), vertical, and with a few *very* minute teeth near their extremity on the inner side.

Examples of both sexes of this Spider were received in 1866 from M. Eugène Simon, by whom they were captured near Paris; and a single adult male was subsequently sent me for examination by Dr. L. Koch, by whom it was found at Nuremberg.

The female resembles the male in colours; but the abdomen is far more convex above, and the genital aperture is of a bright deep red-brown colour.

ERIGONE (NERIENE) SARCINATA, sp. n. (Plate LXV. fig. 13.)

Male adult, length 1 line.

This Spider is nearly allied to *Neriene excisa* (Cambr.): like that species, there is a protuberance or gibbosity on the back part of the caput; but in the present species this gibbosity is situated nearer to the thoracic junction, and is divided from the fore part of the caput by a distinct and rather deep oblique cleft. It is also, when looked at from above and behind, pointed at its fore extremity; the portion of the caput between the cleft and the hind central eyes is also rather gibbous, that part and the outer area forming a longish uniform slope to the clypeus, which is less in height than half that of the facial space. The colour of the cephalothorax is yellow-brown, the gibbosity of the caput being paler. The *falces* are neither very long nor strong, and are similar in colour to the cephalothorax. The *legs* are long, relative length 4, 1, 2, 3, moderately strong, yellow in colour, and furnished with hairs; there is a single short, slender black bristle at the fore extremity, on the upperside, of the genual joints, and a few long, diaphanous, pale, slender erect bristles on other parts of the legs.

The *palpi* are moderately long and strong; the cubital is upwards of three times the length of the radial joint, which is slightly pro-

duced in a curviangular form on the inner extremity; and at the middle of the fore extremity is a small corneous-looking prominent point or tooth. The digital joint is short, oval, and small; the palpal organs are well developed, but not very complex. The form of the palpi distinguishes this Spider readily from *N. excisa*.

The colour of the palpi is the same as that of the legs.

The abdomen is oval, and projects a good deal over the base of the cephalothorax; it is of a sooty yellow-brown colour, marked with some transverse curved lines on the hinder part of the upperside (which are probably only visible in spirit of wine).

An adult male of this very distinct species was received from Dr. L. Koch, by whom it was found at Nuremberg.

ERIGONE (NERIENE, Bl.) DIGITATA, sp. n. (Plate LXVI. fig. 14.)

Male adult, length $\frac{1}{19}$ of an inch.

The whole of this Spider, except the legs and palpi, which are dull greenish yellow, is of a dull greenish sooty-black colour, the abdomen being darker than the rest and sparingly furnished with hairs.

The cephalothorax is elevated in front, the upper part of the caput being rounded, with a deep and conspicuous longitudinal indentation on either side a little below the summit; the caput is furnished with a few short bristly hairs; and the clypeus and eye area are bluff and rounded. The *eyes* are placed on the fore part of the caput, in a somewhat oval group, considerably below the summit, and a little below the midway point of the facial space: the height of the clypeus appeared to be slightly greater than half the facial space, and slightly less than the space from the hind central eyes to the summit of the caput; the hind central eyes are about level with the lateral indentations, and are separated from each other by about the length of an eye's diameter; and about the same distance below them is the fore central pair, the eyes of which are a little smaller and close together; those of the lateral pairs are placed obliquely, the hinder one of each being further from the hind central on its side than the hind centrals are from each other.

The *legs* are slender, and their relative length is 4, 1, 2, 3, those of the fourth pair being perceptibly the longest.

The *palpi* are rather suffused with a greenish sooty hue; the radial joint is stronger than the cubital, enlarged at its extremity, which is produced in front, towards the inner side, into a pointed finger-like apophysis; and towards the outer side is a much shorter but stronger apophysis, the extremity of which is squared off. These projections, and the adjacent portion of the joint, are of a reddish colour; the digital joint is small; the palpal organs are well developed and complex, with a small spiral black spine beneath their extremity.

The *falces* are rather long, but not very strong, sloping towards the extremity on the inner side (where there are a few fine sharp teeth), perpendicular, a little divergent when looked at from the front, and about equal in length to the height of the facial space.

A single example of this Spider was forwarded to me for exami-

nation by Dr. L. Koch, by whom it was found near Nuremberg. It is remarkable from its combining the characters of the *Neriene* and *Walckenaëra* groups in a form and degree that I have not before noticed, having the elevated caput of the latter and the eye-position of the former. In this respect it groups with *Neriene cornuta* and *N. bituberculata*; but the divided caput of these two species, as well as the forms of their palpi, distinguish them at a glance.

ERIGONE (WALCKENAËRA) KOCHII, sp. n. (Plate LXVI. fig. 15.)

Male adult, length $\frac{1}{9}$ of an inch.

This Spider, supposed by Dr. Koch to be *W. unicornis* (Cambr.), is certainly very nearly allied to it, and bears great resemblance to it in the peculiar character of the cephalic eminence; but it differs remarkably, both in the special form of that portion of its structure and in the form and structure of the palpi and palpal organs. In colour the two species are alike; but the present is rather the largest; the perpendicular eminence which issues from the middle of the space occupied by the eyes is much stronger and more conspicuous than in *W. unicornis*, but is (as in that species also) bifid or strongly notched at its extremity; the limbs of the bifid portion, however, are longer and more divergent; and consequently the notch is deeper and larger; near the base in front this projection is prominent, and has some short hairs on the prominent part; it is also placed rather further back upon the caput than in *W. unicornis*, being closer to the eyes of the hinder than to those of the foremost pair. Looked at from above, the extremity of each of the limbs of the bifid part is very shining and much resembling an eye.

The *palpi* differ remarkably in the structure of the radial joint from those of *W. unicornis*; it is very short, and very narrow at its junction with the cubital joint, whence it enlarges suddenly, and has two long, strong apophyses from its extremity, a little on the inner side; the outermost of these is rather the shortest, and is bifid at its extremity, one limb of the bifid part being longer than the other and of a deep black-brown colour, but not so strong; the other apophysis adheres more closely to the digital joint, and is pointed at its extremity, and gibbous on its outer and upper edge. The palpal organs are highly developed and complex, and have a black filiform spine coiled round their extremity on the outer side.

A single example of this interesting species was received for examination in 1868 from Dr. Koch, by whom it was found at Nuremberg, and after whom I have taken the liberty of naming it. Very lately (May 1872) I have received another example of it from Warsaw, where it was found by M. Taczanowski, "Conservateur" of the Zoological Museum at Warsaw, by whom it has been most obligingly submitted to my inspection, among many other rare and interesting forms of this genus.

ERIGONE (WALCKENAËRA) MONODON, sp. n. (Plate LXVI. fig. 16.)

Male adult, length $\frac{2}{3}$ of a line.

Cephalothorax dull yellow-brown; legs and palpi pale dull yellow, with a brownish tinge; abdomen black.

The upper part of the caput is elevated into a not very high conical eminence, which slopes all round gradually into the sides; the summit is furnished pretty thickly with hairs. The eyes are placed at the base of the cone, almost forming a ring round it; they are in four pairs; those of the foremost pair equally divide the height of the facial space, and are small and not quite contiguous to each other; those of each lateral pair are contiguous to each other and are the largest of the eight; each eye of the posterior pair is placed a little above and behind the hinder eye of the lateral pair on its side, the space between the posterior eyes being thus much greater than that between each and the lateral eye nearest to it. Legs moderately long, rather slender, and furnished with hairs only. The palpi are not very long; the radial joint is produced over the base of the digital into a broad, rather oblong, oval form, slightly emarginate at its fore extremity, the inner corner of this portion being produced into a sharp-pointed corneous spine, which bends round sharply outwards, and its prominent point extends beyond the outer corner of the emargination. The cubital joint has a single small tapering bristle at the edge of its fore extremity on the upperside, directed downwards; the digital joint is not very large, and of oval form; the palpal organs are neither very prominent nor complex.

An adult male of this very distinct little species was received from Dr. L. Koch, by whom several examples have been found in the neighbourhood of Nuremberg.

Erigone (Walckenaëra) scurrilis, sp. n. (Plate LXVI. fig. 17.)

Male adult, length $\frac{1}{14}$ of an inch.

The *cephalothorax* is large and bluff before; and the caput is elevated (principally on the occiput) into a considerable subconical eminence, which leans rather backwards; the profile line from the summit of this eminence to the fore central pair of eyes is sloping, and very slightly impressed below the middle; from this point to the margin of the clypeus it runs in a slightly convex form; the face and upper portion of the elevation is furnished with strong bristly black hairs, those nearest the summit spreading over the sides and behind, where several, stronger and longer than the rest, droop and fall backwards like a queue. The *eyes* are all very minute, and seated on black spots; those of the fore central pair are the smallest of the eight, and are placed a little below the commencement of the eminence on the caput; those of each lateral pair are seated obliquely and are in the same straight line as the fore centrals; above each lateral pair, and at about the same distance from them as they are on either side from the fore central pair, is placed one of the hinder pair of eyes; these are widely removed from each other, on the sides of the lower part of the subconical elevation of the caput, and, with the fore centrals, form as nearly as possible (when looked at from the front) an equilateral triangle.

The *palpi* are moderately long and strong; the cubital joint curves forwards, and has some coarsish dark hairs on its outer side; it is longer than the radial joint, and slightly clavate at its fore extremity: the radial, though shorter, is stronger than the cubital, and is a little produced at its fore extremity, where it terminates in two small reddish-brown prominent points, the outer one of these being the longest and strongest; this joint has also some longish coarse hairs near its base on the outer side; the digital joint is not large; and the palpal organs are well developed and rather complex, of a reddish-brown colour, and with a short, curved, black, corneous, spiny process at their extremity.

The *abdomen* is clothed rather more conspicuously with hairs than is usual with Spiders of this genus; but the form and structure of the legs, falces, maxillæ, and labium is of the ordinary character. The colour of the cephalothorax and other fore parts is, in the example described, of a pale yellowish white, the abdomen being of a pale dull sooty black; but as it had evidently not long effected its last change of skin, the paleness of colouring cannot be taken as a specific character.

The position of the eyes of the upper pair, with the form and clothing of the cephalic eminence and the structure of the palpi, make this species easily recognizable.

A single example was sent me for examination by Dr. L. Koch, by whom it was found near Nuremberg.

ERIGONE (WALCKENAËRA) SIMILIS, sp.n. (Plate LXVI. fig. 18.)

Male adult, length $\frac{1}{4}$ of an inch.

The fore part of this Spider is of a rich deep brown; the legs and palpi (except the digital joints) orange-coloured, and the abdomen dull greenish sooty black, with pale yellowish lines visible, probably only after immersion in spirit of wine. The upper part of the caput is elevated, and the clypeus bluff, rounded, and prominent; and a strong indentation, running backwards above and behind each lateral pair of eyes, divides the elevation of the caput laterally from the lower part, while a slight transverse groove divides it from the lower part in front; the clypeus and upper part of the caput is smooth and glossy, and rather paler than the rest, all of which is covered with minute punctures, as also is the sternum, on which, however, the punctures are of a coarser nature. The eyes are in the usual position—when looked at from the front, nearly a square, the upper side being rather shorter than the lower, the other sides intermediate in length between the two. The legs are moderately long and strong, and are furnished with hairs and a few fine erect bristles.

The *palpi* are moderate in length; the cubital joint is short; the radial is greatly produced at its upper extremity, covering the greater part of the digital joint; its exact form near the extremity was very difficult to be seen satisfactorily in the only example that has come under my notice; but it appeared to curve round from the inner to the outer side, and terminate in a sort of point, there being within the curvature a prominent pale and somewhat corneous projection;

the outer side of the produced part of the radial joint also has a blunt, angular, prominent point. The digital joint is not large; the palpal organs are rather complex, and have, among others, a strongish but short curved black spine near their extremity on the outer side.

The female resembled the male in the punctured thorax and sternum, and in colours; but the caput was less elevated; and the only example of this sex (♀) examined was rather smaller, though adult.

An adult male and female were received from Dr. L. Koch, by whom they were found near Nuremberg, Bavaria. It is very nearly allied to, but quite distinct from, *Walckenaëra latifrons* (Cambr.).

ERIGONE (WALCKENAËRA) PRÆGRACILIS, sp. n. (Plate LXVI. fig. 19.)

Male adult, length $\frac{1}{20}$ of an inch.

The whole of the fore part of this Spider (except the legs and palpi) is of a dark greenish black-brown colour, the falces being rather the palest and the sternum the darkest. The *legs* are rather long (their relative length 4, 1, 2, 3), and far slenderer than usual in this genus; they are of a pale yellow colour, and are furnished sparingly with short hairs; the abdomen is black.

The *cephalothorax* has the caput elevated; the elevation is (looked at in profile) sloping and flattish in front, and sloping but rounded behind; it is constricted on the sides, and has a deep longitudinal groove or excavation running backwards from each lateral pair of eyes and reaching to the occiput; the clypeus is rather prominent and rounded, and its height exceeds half that of the facial space.

The *eyes* are dark-coloured and difficult to be seen; the hind centrals are widish apart, and seated on the upper fore margin of the cephalic eminence; the fore centrals are the smallest and seated on a strong tubercle; those of each lateral pair are placed obliquely, the fore one slightly below the straight line of the fore centrals.

The *palpi* are slender: the cubital joint is short, but slightly longer than the radial; it is bent forwards (or downwards) and has a minute prominent point beneath its base, when looked at in profile. The fore extremity of the radial joint is produced into a long, rather narrow apophysis, which reaches obliquely over the digital joint, extending to half its length; it is bifid at its extremity; the outer or lower limb of the bifid part is much the longest, the other limb being a mere short, sharp, prominent point. From beneath the outer side of the radial apophysis there issues a strong reddish-coloured corneous process, whose somewhat pointed extremity curves upwards by the side of the bifid extremity of the apophysis; the radial joint is also slightly gibbous in front, towards the outer side; and the gibbous portion is furnished with a group of a few longish coarse hairs. The palpal organs are complex and prominent, and have a double, circularly curved, strongish black spine near their extremity.

The *sternum* is convex, but has a large, shallow, circular indentation forwards: possibly this may have been the result of injury.

A single example of this species was received for examination from Dr. L. Koch, by whom it was captured at Nuremberg. It is nearly allied to *W. picina* (Bl.), but differs in the structure of the palpi, as well as slightly in the form of the cephalothorax.

ERIGONE (WALCKENAËRA) SALTUENSIS, sp. n. (Plate LXVI. fig. 20.)

Male adult, length 1 line=$\frac{1}{12}$ of an inch; female adult, $\frac{1}{9}$ of an inch.

This species is closely allied to *Walckenaëra minima* (Cambr.) (*W. pusilla*, Westr.), but is larger, and, though resembling it a good deal in general appearance, differs in some well-marked characters.

The *cephalic eminence* is broad, but not very high. The transverse line of the summit (when looked at from the front) is slightly hollowed; it is also constricted laterally at its base, and has a well-marked longitudinal indentation, which runs backwards from each lateral pair of eyes, besides a considerable excavation on either side beneath the occiput. The clypeus is nearly perpendicular from a very little way below the fore central eyes; and its height is nearly two thirds of that of the facial space. The sloping and vertical space between and below the four central eyes is clothed with short, strong, divergent hairs.

The *eyes* of the hinder or upper pair occupy the fore corners of the cephalic eminence, and are thus very wide apart, as wide apart as, or even wider than, the two lateral pairs; these and the eyes of the hinder pair form a rectangle whose transverse diameter is nearly double that of its longitudinal one. The eyes of the fore central pair are the smallest of the eight, near together, and situated a very little above the straight line of the lateral pairs.

The *legs* of the fourth pair are perceptibly longer and slenderer than those of the first; their relative length is 4, 1, 2, 3; and their colour is a dull orange-yellow tinged with brown; they are furnished with hairs; and a short, erect, black, spiny bristle issues from near the centre, on the upperside, of the tibiæ of the fourth pair.

The *palpi* are strong; the cubital joint is clavate and rather gibbous on the upperside: the radial joint is shorter and less strong than the cubital, and has its upper extremity slightly produced; the produced part is emarginate at its extremity, and has a small tubercular prominence near its base, on the inner side; this production and prominence are of a deep red-brown colour, the rest of the joint being pale yellow-brown: the digital joint is rather large, and has a conical prominence at its base, on the inner side. The palpal organs are rather complex; they have a curved corneous process at their base near the extremity, on the outer side, of the radial joint, and a short, prominent, tapering black spine, curved in a somewhat circular form, at their outer extremity.

The *falces* are strong, straight, perpendicular, and equal in length to the height of the clypeus.

The colour of the cephalothorax is dark brown, mixed with blackish and tinged with yellow, the upper part of the cephalic

eminence being paler than the rest. The falces, maxillæ, and labium are yellow-brown; and the sternum is suffused with black.

The abdomen is oval, moderately convex above, and sparingly clothed with hairs; its colour is black, mottled with pale whitish, and with some transverse angular lines on the hinder part of the upperside, near the centre of which is a rectangular figure formed by four depressed dots.

The female is much larger than the male, and has the caput distinctly elevated, though not to nearly so great an extent as that of the male; the lateral pairs of eyes also in the female are wider apart, in comparison with the eyes of the hinder pair, than those of the male; the form of the genital aperture is distinctively characteristic.

An adult male and female were received for examination from Dr. L. Koch, by whom they were captured near Nuremberg.

ERIGONE (WALCKENAËRA) CITO, sp. n. (Plate LXVI. fig. 21.)

Male adult, length $\frac{1}{17}$ of an inch; female adult, length $\frac{1}{13}$.

The *cephalothorax* is of a yellowish-green colour, with a sooty tinge, and narrowly margined with black; the *legs* are of a dull yellowish brown, as are also the palpi, falces, and maxillæ, the sternum and labium being more suffused with sooty brown. The colour of the abdomen is black-brown; it is also sparingly clothed with hairs, and somewhat rugulose.

The *caput* is elevated, the elevated portion being nearly the height of the clypeus, or about one third of the length of the cephalothorax; the upper part of the elevation is rounded, and (looked at in profile) a little receding; *i. e.* there is a strongish impression above the fore central pair of eyes; a patch between these eyes and those of the hind central pair (but nearer to the former) is thickly clothed with hairs, and there are a few short but prominent hairs on the occiput; just above and behind each lateral pair of eyes is a deep circular pit or depression, which has a white shining appearance, something like an eye, and around and behind these pits the surface is indented, the indentation running backwards, in a pointed form, to the occiput.

The *eyes* are placed on small black spots; the fore lateral are in a straight line with those of the fore central pair; those of the hind central (or upper) pair are rather wide apart, and just beneath the fore margin of the elevation; those of each lateral pair are placed obliquely on small tubercles; the fore centrals, which are contiguous to each other, are very small and difficult to be seen, and each of these is rather more than an eye's diameter from the fore lateral eye on its side. The *clypeus* is rather prominent, bluff, and rounded, and its height is nearly equal to half that of the facial space.

The *legs* are moderate in length and strength, as also are the *palpi*, whose cubital joints are rather clavate and bent, and much longer than the radials; these are short and prolonged at their fore extremity into two apophyses: one, rather on the inner side is long, tapering, pointed, and slightly curved outwards; the other (towards the outer side) is shorter, and terminates in a sharp black spiny point, with a small tubercle near its base. The digital joint

is of moderate size and ordinary form; the palpal organs are prominent and complex, with a small, slender, coiled black spine at their extremity. The *falces* are small, straight, and a little inclined backwards to the maxillæ, which, together with the labium and sternum, are of ordinary character.

The female resembles the male in colour, but is larger and devoid of the elevation of the caput; the form of the genital aperture is characteristic, but easier to be seen in the figure than to be made out from a description.

An adult example of each sex was received for examination from Dr. Koch. by whom they were captured near Nuremberg. It is allied to *Walckenaëra nemoralis* (Bl.), *W. implana* (Cambr.), and *Erigone blackwallii* (Cambr.), but may easily be distinguished by the form and structure of the palpi and other characters.

ERIGONE (WALCKENAËRA) BLACKWALLII, sp. n. (Plate LXVI. fig. 22.)

Male adult, length $\frac{3}{4}$ of a line.

The *cephalothorax*, which is smooth and glossy, is large and elevated in front, rather flattened behind, and impressed laterally behind the lateral pairs of eyes; clypeus bluff and rounded, and its height is equal to (if it does not exceed) half that of the facial space; the space between the fore and hind central pairs of eyes is impressed, when looked at in profile; and the lower part of this space is clothed with hairs. The eyes are in the ordinary position; and immediately behind and above each lateral pair is a strong, somewhat circular pit or indentation. The general area occupied by the eyes is broader than long; *i. e.* the interval between the foremost eyes of the lateral pairs is greater than that between each of these and that of the upper pair on its side. The falces are not very large; they are placed considerably back, beneath the clypeus, and are inclined towards the sternum. The colour of the cephalothorax and falces is dark brown, with a yellowish tinge. *Legs* dull orange-yellow, rather short and moderately strong, furnished with hairs only. *Palpi* moderately long, strong, similar in colour to the legs, except the digital joint, which is deep brown. The cubital joint is much stronger than the radial; this last is very short, and has its inner extremity prolonged into a longish, slightly tapering, pointed, curved apophysis, the point directed outwards; on the outer extremity, towards the underside, is another, small, sharp-pointed, corneous apophysis, its extreme point being bent outwards. The digital joint is large and of an oval form; the palpal organs are well developed, but not very complex, with several corneous prominences and spines, a small circularly curved one of which latter is at their fore extremity. The *abdomen* is large, somewhat flattened, and projects considerably over the base of the cephalothorax; the greater part of its upperside is covered by a sort of coriaceous shield or separate integument similar to that in *W. nemoralis* (Bl.), to which species it is nearly allied; this shield is covered with minute punctures; four more conspicuous punctures form a quadrangle on the

centre, and a few short hairs are distributed over its surface. Its colour is deep brown above, of a somewhat bistre brown tint, the underside being blackish.

The female is rather larger than the male, but resembles it in colours, except that the abdomen is blacker; the cephalothorax is gibbous above in front, but, like all others in this genus, nothing like as elevated as in the male, though preserving its general characters; the form of the genital aperture is characteristic.

Adults of both sexes were received from Dr. Ludwig Koch, by whom they were captured near Nuremberg, in Bavaria. In accordance with Dr. Koch's wish, I have here (as in other instances) retained the name conferred upon this species, in compliment to Mr. Blackwall, by Dr. Koch in his MS. notes.

ERIGONE (WALCKENAËRA) ELEGANS, sp. n. (Plate LXVI. fig. 23.)

Male adult, length $\frac{3}{4}$ of a line, or $\frac{1}{16}$ of an inch.

Cephalothorax deep brown, approaching to black; the fore part bluff, rounded, and massive, with a distinct but not very large oval eminence on the upperside of the caput. The normal indentations are very strongly marked; and the lateral margins are depressed; these are all also otherwise indicated by blackish lines. The *eyes* are in the ordinary position: two are situated on the fore part of the upper side of the eminence on the caput; below each of these is a lateral pair, the eyes of which are contiguous and seated just below the junctional groove or impression between the eminence and the lower segment of the caput; those of the fore central pair are minute, contiguous, and nearly in a straight line with those of the lateral pairs: a strong elongated indentation runs backwards from just above and behind each lateral pair of eyes; and the height of the clypeus appeared to be slightly greater than one half of that of the facial space.

The *legs* are rather long, moderately strong, and of a pale yellow colour; they are furnished only with hairs.

The *palpi* are short, similar in colour to the legs, except the digital joints, which are dark brown; the radial is much stronger than the cubital joint, and, looked at from above and behind, is of a somewhat crescent-form, with a small black, sharp-pointed, tooth-like prominence in the centre of the hollow side, directed sharply inwards, between the horns of the crescent; this tooth-like prominence appeared to terminate with a pointed spiny bristle. The digital joint is moderate in size and of a short oval form, with apparently one or two subangular prominences near its base. The palpal organs are rather complex; on their outer side is a rather long, strongish, circularly curved black spine. The *falces* are short, strong, subconical, and directed backwards beneath the clypeus. The *abdomen* is oval, and projects a good deal over the base of the cephalothorax; its colour is jet-black.

An adult male was received from Dr. L. Koch, by whom it was captured near Nuremberg, Bavaria.

ERIGONE (WALCKENAËRA) ALPINA, sp.n. (Plate LXVI. fig. 24.)

Male adult, length $\frac{1}{11}$ of an inch.

This species, which has the fore part of the cephalothorax divided into two segments, is allied to *W. cristata* (Bl.) and *W. latifrons* (Cambr.); but it may be easily distinguished by its larger size and the much larger proportion that the hinder segment of the cephalic eminence bears to the fore one. In this respect there is a great resemblance to *Erigone cucullata* (Koch); from this, however, it is easy to separate it, as the hinder segment in *E. cucullata* projects far more forwards than that in the present species.

The colour of the cephalothorax is dark yellow-brown, that of the abdomen (which is large, oval, and very convex above) being of a dull black colour, clothed with hairs. The legs and palpi are pale yellow, except the radial and digital joints of the latter, which are dark brown.

The hinder segment of the caput is large and rounded at its summit, the occipital line (in profile) a little sloping, the frontal line more vertical; the fore segment is not one third as strong as the hinder one, and it is a little prominent; its summit, as well as the upper fore margin of the hinder segment, is furnished thickly with strong hairs, which meet over the cleft between the two segments; this cleft is (when looked at in profile) equal in width to the breadth of the fore segment, but is wider at the top than at the base.

The *eyes* are placed in the usual four pairs: those of one pair, on the summit of the hinder segment, are wide apart; those of another pair, on the upper fore margin of the foremost segment, are dark-coloured and difficult to see; those of each lateral pair are contiguous to each other, and seated just below the base of the cleft on either side; behind each lateral pair is a large, longitudinal, somewhat oval excavation; and at its larger end (near the eyes) is a circular shining pit or depression.

The *palpi* are of ordinary length and strength: the cubital joint curves forwards; it is long and much enlarged (or clavate) at its fore extremity, near which, on the upperside, is a short, strong, black bristle; the radial joint is short, prominent behind, and produced in front into a large somewhat oblong apophysis with a sharply curved corneous-looking point issuing from its inner extremity and reaching to its outer one, between which and the base of this curved point is a somewhat circular excavation or emargination; this apophysis covers a considerable portion of the outer surface of the digital joint; and the outer surface of the two digitals are turned towards each other: the palpal organs are prominent and complex, with corneous spines, processes, and transparent membrane.

The *falces* are equal in length to the height of the clypeus; they are strong, straight, and with some fine teeth towards their extremities on the inner sides.

A single example of this Spider was found by myself high up on one of the mountains near Bruck-am-Muir, in Styria, in June 1865; and I have since received another for examination from Dr. Ludwig

Koch, by whom it was captured in the Tyrolese Alps, at an elevation of 6000 feet.

LIST OF SPECIES, WITH REFERENCES TO PAGE, PLATE, AND LOCALITY.

Erigone arietans, p. 748, Plate LXV. fig. 1. Nuremberg.
—— *incomta*, p. 748, Plate LXV. fig. 2. Nuremberg.
—— *forensis*, p. 749, Plate LXV. fig. 3. Rome.
—— *prominula*, p. 750, Plate LXV. fig. 4. Nuremberg and England.
—— *inconspicua*, p. 751, Plate LXV. fig. 5. Nuremberg.
—— *romana*, p. 752, Plate LXV. fig. 6. Rome.
—— *sila*, p. 753, Plate LXV. fig. 7. Nuremberg.
—— *pallens*, p. 753, Plate LXV. fig. 8. Nuremberg.
—— *biscissa*, p. 754, Plate LXV. fig. 9. Bayreuth (Bavaria).
—— *græca*, p. 755, Plate LXV. fig. 10. Corfu.
—— *alexandrina*, p. 755, Plate LXV. fig. 11. Alexandria (Egypt).
—— *simonii*, p. 756, Plate LXV. fig. 12. Paris and Nuremberg.
—— *sarcinata*, p. 757, Plate LXV. fig. 13. Nuremberg.
—— *digitata*, p. 758, Plate LXVI. fig. 14. Nuremberg.
—— *kochii*, p. 759, Plate LXVI. fig. 15. Nuremberg and Warsaw.
—— *monodon*, p. 759, Plate LXVI. fig. 16. Nuremberg.
—— *scurrilis*, p. 760, Plate LXVI. fig. 17. Nuremberg.
—— *similis*, p. 761, Plate LXVI. fig. 18. Nuremberg.
—— *prægracilis*, p. 762, Plate LXVI. fig. 19. Nuremberg.
—— *saltuensis*, p. 763, Plate LXVI. fig. 20. Nuremberg.
—— *cito*, p. 764, Plate LXVI. fig. 21. Nuremberg.
—— *blackwallii*, p. 765, Plate LXVI. fig. 22. Nuremberg.
—— *elegans*, p. 766, Plate LXVI. fig. 23. Nuremberg.
—— *alpina*, p. 767, Plate LXVI. fig. 24. Bruck-am-Muir, Styria, and the Tyrol.

EXPLANATION OF THE PLATES.

Plate LXV.

Fig. 1. *Erigone arietans.*
a, cephalothorax, in profile; *b*, left palpus, from inner side.
2. *Erigone incomta.*
a, cephalothorax, in profile; *b*, cephalothorax and falces, from the front; *c*, *d*, left palpus in two positions.
3. *Erigone forensis.*
a, cephalothorax and abdomen, in profile; *b*, ditto, from the front; *c*, abdomen (♀), in profile; *d*, genital aperture (♀); *e*, left palpus (♂), from outer side; *f*, radial and cubital joints of right palpus (♂).
4. *Erigone prominula.*
a, cephalothorax, in profile; *b*, eyes, from the front; *c*, *d*, *e*, portions of palpi in different positions.
5. *Erigone inconspicua.*
a, abdomen, in profile; *b*, ditto, from the front; *c*, *d*, left palpus in two positions.
6. *Erigone romana.*
a, cephalothorax and abdomen (♂), in profile; *b*, abdomen (♀), in profile; *c*, genital aperture (♀); *d*, left palpus (♂), from outer side.
7. *Erigone sila.*
a, cephalothorax and abdomen; *b*, caput, from above and behind; *d*, ditto, from the front; *e*, *f*, left palpus in two positions; *c*, portion of right palpus, in profile.
8. *Erigone pallens.*
a, cephalothorax and abdomen, in profile; *b*, caput, from the front; *c*, right palpus, from outer side; *d*, portion of left palpus, in profile.

Fig. 9. *Erigone biscissa.*
a, cephalothorax and abdomen, in profile; *b*, caput, from the front; *c*, left palpus, from outer side in front; *d*, *e*, portions of ditto in two positions, from behind.

10. *Erigone græca.*
a, cephalothorax and abdomen, in profile; *b*, left palpus.

11. *Erigone alexandrina.*
a, cephalothorax and abdomen (♂), in profile; *b*, caput (♂), from the front; *c*, right palpus (♂), from the front; *d*, genital aperture (♀).

12. *Erigone simonii.*
a, cephalothorax and abdomen (♂), in profile; *b*, caput (♂), from the front; *c*, left palpus, from outer side; *d*, right palpus, from inner side.

13. *Erigone sarcinata.*
a, cephalothorax and abdomen, in profile; *b*, cephalothorax, from above and behind; *c*, ditto, from the front; *d*, left palpus.

Plate LXVI.

14. *Erigone digitata.*
a, cephalothorax, in profile; *b*, caput, from the front; *c*, eyes, from the front; *d*, cubital and radial joints of left palpus, from above and behind; *e*, ditto of right palpus.

15. *Erigone kochii.*
a, *b*, cephalothorax, in profile; *c*, caput, from the front; *d*, cephalothorax, from above and behind; *e*, right palpus; *f*, left ditto.

16. *Erigone monodon.*
a, cephalothorax and abdomen, in profile; *b*, caput, from the front; *c*, right palpus, from above and behind.

17. *Erigone scurrilis.*
a, cephalothorax and abdomen, in profile; *b*, left palpus; *c*, cubital and radial joints of right ditto; *d*, caput, from the front.

18. *Erigone similis.*
a, cephalothorax and abdomen (♂), in profile; *b*, cephalothorax (*id.*), from the front; *c*, *d*, *e*, palpi (♂) in different positions; *e*, genital aperture (♀).

19. *Erigone prægracilis.*
a, cephalothorax and abdomen, in profile; *b*, caput, from the front; *c*, right palpus; *d*, left ditto; *e*, portion of right ditto; *f*, cubital joint of palpus.

20. *Erigone saltuensis.*
a, cephalothorax and abdomen (♂), in profile; *b*, ditto (♀); *c*, caput, from the front; *d*, palpus (♂); *e*, *f*, genital aperture (♀).

21. *Erigone cito.*
a, cephalothorax and abdomen (♂), in profile; *b*, caput, from the front; *c*, *d*, *e*, portions of left palpus (♂) in different positions; *f*, genital aperture (♀).

22. *Erigone blackwallii.*
a, cephalothorax and abdomen (♂), in profile; *b*, caput (*id.*), from the front; *c*, *d*, *e*, left palpus (♂) in different positions; *f*, genital aperture (♀).

23. *Erigone elegans.*
a, cephalothorax and abdomen, in profile; *b*, caput, from the front; *c*, ditto, above and behind; *d*, left palpus, from outer side; *e*, right ditto, above and behind.

24. *Erigone alpina.*
a, cephalothorax, in profile; *b*, ditto, from the front; *c*, *d*, portions of left palpus in different positions.

6. Observations on the Macaques.—II. Bélanger's Monkey. By Dr. James Murie, F.L.S., F.G.S., &c.

[Received May 29, 1872.]

Macacus arctoides, Is. Geoff.

Macacus arctoides, Is. Geoff. St.-Hilaire, Zool. de Voy. de Bélanger, 1830; Mag. de Zool. 1833, pl. i., and Cat. Mus. Hist. Nat. Paris, 1851, p. 31; Chenu, Encycl. d'Hist. Nat. p. 148, fig. 118.

Pithecus arctoides, De Blainville, Ostéographie, Atlas, ii. pl. vii. figs. 1, 2, 3.

Macacus arctoides, Gerrard, B. M. Cat. of the Bones of Mammalia, 1862, p. 16.

Macacus melanotus, Gray, B. M. Cat. of Monkeys, Lemurs, and Fruit-eating Bats, 1870, p. 29.

Macacus brunneus, Anderson, P. Z. S. 1871, p. 628.

In a communication to this Society, Dr. J. Anderson, the active Superintendent of the Indian Museum at Calcutta, gave the diagnosis and a short description of a male Monkey from Bhamô, in Upper Burmah, which he believed to be new to science. He designated it the Brown Monkey, *Macacus brunneus*.

A second notice followed on its external characters and anatomy, and was read on the 6th of February last. This referred more particularly to a young male from Cachar, where it is said they are not common. Mr. Jamrach, I believe, brought over some live specimens; and at present there are one male and two females exhibited in the Gardens.

Thoroughly interested in Dr. Anderson's first letter, I was still more so in his second notice; for I surmised he had come across a rare although already known species, and I was partially prepared for his mention of certain peculiarities in its anatomy.

On a recent visit to the Society's Monkey-house I examined carefully all three specimens answering to the labels *Macacus brunneus*, and therefrom recognized, as I had anticipated, a species originally described and figured by Is. Geoff. St.-Hilaire.

A male, the type of the species*, was first transmitted to the Musée d'Hist. Naturelle at Paris by M. Diard (1822), who obtained it in Cochin-China. Another specimen, also from Cochin-China, formed part of the collection of one of the French voyageurs, and was formally described but not figured by Is. Geoffroy, "dans la Zoologie du Voyage de M. Bélanger, 1830." Again, under the same name, Macaque ursin (*Macacus arctoides*), the above-named writer gave some remarks and a coloured figure of it in Guérin's Mag. de Zool. 1833, pl. i.

M. St.-Hilaire clearly defines it from the Red-faced Monkey and the "Macaque de l'Inde." He observes in the catalogue:—"Espèce très-distincte de la précédente [*M. speciosus*] par ses longs poils plu-

* *Vide* Mag. de Zool. and Cat. Mus. Hist. Nat. Paris, as above referred to.

sieurs fois annelés de brun et de roux-clair, par l'extrême brièveté de sa queue," &c.

Dr. Anderson's recent articles, then, as I infer, contain an elaborate justification of the exterior characters, dental and osteological points, of Geoffroy's species, amplified by what is patent in the Society's living specimens. I am compelled, therefore, to sink *M. brunneus* as a synonym.

It behoves me to remark that Dr. Anderson's two papers otherwise are most useful. They prove that the geographical distribution of this Monkey is wider than might have been anticipated.

His anatomical notes include descriptions of the tongue, hyoid pouch, and internal viscera, all good in their way. Other data also hitherto unrecorded are on the male generative organs and the tail-structures. The peculiar form of the penis, and the fact of its containing a fair-sized bone, are not essentially restricted to this species. As I shall show in another paper, the Japanese Monkey (or Brilliant Macaque), *M. speciosus*, a form closely allied to the *M. arctoides*, has male organs almost identical in pattern. As to the terminal vertebræ of the tail, and the habit of its sitting on the latter appendage, I leave my comparisons and remarks till treating of the *M. speciosus*. I am not prepared, however, to accept *in toto* his explanation, or Lord Monboddo's theory.

Seeing that the common name of Brown Monkey is no longer applicable, and the original appellation of St.-Hilaire, "Macaque ursin," anglicized into Bear Macaque, is in a measure defective, I propose another cognomen, viz. that of Bélanger's Monkey.

7. Observations on the Macaques.—III. The Formosan or Round-faced Monkey. By Dr. JAMES MURIE, F.L.S., F.G.S., &c.

[Received June 4, 1872.]

Mr. Swinhoe of late years has done much towards the elucidation of the Chinese fauna; and this Society has on many occasions been indebted to him for rare live specimens. Among others of interest was the How-tsze, or Kaou, a Formosan Rhesus-like Monkey, described and figured by him (P. Z. S. 1862, p. 353, pl. xiii.) under the title of *Macacus cyclopis*.

The native names given by Mr. Swinhoe recall to me two articles, "On the Monkeys known to the Chinese, from the Native Authorities," by Mr. Samuel Birch, of the British Museum, and published in 'Charlesworth's Magazine' for 1839-40*. The articles refer to some of the old pictorial encyclopædias of the Chinese; and, as Mr. Birch observes, "the fabulous and the true, imagination and observation, are alike blended in a disorder startling to a European eye"†.

* Mag. of Nat. Hist. vol. iii. new ser. 1839, p. 587, and vol. iv. p. 35.
† Ibid. vol. iii. p. 592.

Whether any of the undermentioned really allude to Mr. Swinhoe's animals I know not; but the description is so droll as to be worth quoting as a footnote*.

In the recent B. M. Catalogue†, Dr. Gray ambiguously places *M. cyclopis* under *M. rhesus*, again adding it as a separate species in the Appendix ‡.

Dr. Sclater § once suggested that good points of distinction might present themselves when the specimen was more narrowly examined, but lately ‖ quite discards such a notion. Commenting on the *M. lasiotis* as a Rhesus with its tail chopped off, he observes, respecting Mr. Swinhoe's Chinese Monkeys, *M. cyclopis*, *Inuus sancti-johannis*, and *M. rhesus*, from Hainan:—"My own opinion is, that none of these supposed species, any more than *M. lasiotis*, are yet proved to be really well established as specifically distinct from *M. rhesus*."

My examination of the skeletons of the type specimens of *M. cyclopis* enables me to demonstrate characters certainly differing from those of the ordinary Rhesus Monkey.

Of the two animals which lived in the Gardens, it was observed that when the female arrived at maturity, the callosities and the region generally at the root of the tail became extremely developed. Indeed, at certain times, the buttocks &c. acquired such hideous proportions, that it was necessary, for decency's sake, to remove her from the public gaze. When this unlooked-for phenomenon, equivalent to menstruation in the human being, first occurred, my atten-

* The Hwatso is a fabulous animal, and consequently an object of superstition. "In the Yaoukwang hills are animals whose exterior appearance is like a Mehow, with human face and hog's bristles. During the winter they dwell in caves." [Mr. Swinhoe notes that *Macacus cyclopis* "seems to be quite a rock-loving animal, seeking the shelter of caves during the greater part of the day."] "They are called Hwatso; their cry is like cut water; and when seen they are ominous of a conscription. The 'cut water' probably refers to the noise of a mill. The expression 'yaou yih' in the text appears to imply the power that the Chinese, in common with other despotic Asiatic governments, have of forcing people to work for them. Yih is literally 'police runners to send out,' &c."

"The Yew are like the Mehow, and of a deep yellow and black colour; their tails are several cubits long, like an Otter's, but have no tufts. When they scent the dew ascending to form rain, they then suspend themselves from a tree by means of their tails, to fill their nostrils with it, or else by both feet. In Keantung they call them carriers, Wuhkëen."—p. 38.

"The Gaou are said to inhabit the Lunseen hills, to be like an ape, with long arms, to be good for killing, and called Gaou."—p. 34. "The Yuen's arms, when cut through at the thick part, can be made into flutes rounder than reeds. They are of the Monkey tribe, having long legs, and are good whistlers, given to dragging things about, whence their name is derived from the character 'yuen,' to drag or lead."—p. 36.

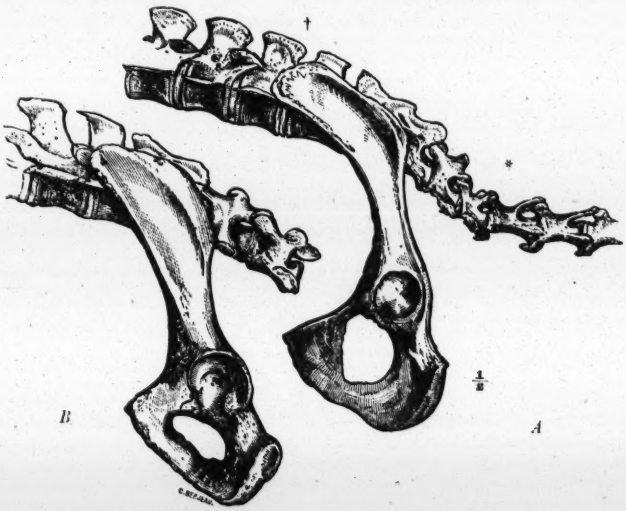
"The Jen are like the common Monkey (how), with green body and dark jaws; they have black whiskers; their paws are also black. They are naturally very fond of their whiskers, and dote on their species, living and dying together; on which account, if one can be got at, a hundred may be killed. Men shoot them with poisoned arrows; the shot animal's companions draw out the arrow in order to wound themselves, and die with one another." They are also called Kwojen. (*Vide* Morrison, 'Dict. Chin. and Engl.' part ii. vol. i. p. 321, 4to, Macao.)—*Ibid.* Birch, 1840, p. 36.

† Of Monkeys, Lemurs, and Fruit-eating Bats, 1870, p. 31.

‡ Ibid. p. 128. § P. Z. S. 1864, p. 710. ‖ P. Z. S. 1871, p. 222.

tion was called to the fact by the keeper. Sure enough it was a most extraordinary sight. In the female Rhesus Monkeys and the Baboons, at stated periods the hinder parts become unusually florid and puffy, but generally speaking the tumidity is restricted within reasonable bounds. In the case of the Round-faced Monkey, however, not only are the callosities and external genitalia swollen, but

Fig. 1.



Side view of pelvis and part of spinal column of the ♀ and ♂ *Macacus cyclopis*, showing their remarkable pelvic angle, as compared with *M. erythræus*. See also fig. 1, p. 724, of *M. maurus*, and fig. 1, p. 782, of *M. speciosus*.
A. Female, the asterisk (*) pointing to alteration in the direction of the tail, between the first and second caudal vertebræ, the dagger (†) to the spine of the seventh lumbar. *B*. Male, with less curvature of the parts.

even the proximal end of the tail is inordinately increased in dimensions. In short, the whole of the posterior parts are literally a mass of deformity. The skin and subcutaneous tissues are frightfully distended, purple, deep red, and roseate, and here and there bagged out in great folds as if they were ready to burst from sanguineous and serous effusion. It is a hideous spectacle! A woodcut representing such condition of the parts has been given in our 'Proceedings' for 1864, p. 711, which, though to some extent true to nature, fails to give a vivid conception of this most exuberant sexual development.

One is prepared to perceive that the immense dilatation of the buttocks almost necessitates an adaptation of the ischial bones, other

than what obtains in the common Rhesus. As the illustrations show, the above apparently temporary change in the posterior soft parts of the Formosan Monkey is actually correlated with osteological structure of an aberrant kind.

In this latter species I find that the pelvic bones have a most unusual curvature in their long axis, certainly very different from the Rhesus and other Macaques. The ilium anteriorly overrides the sacrum far more than is ordinarily the case. Its upper surface is markedly concave transversely, but longitudinally is strongly convex. The inferior or inner face has an outer sulcus, which, reversely, is a prominence in the Rhesus and other species of the genus. The ischial tuberosities are remarkably truncate and pedate. The subpubic angle is short, narrow, and the thyroid foramen large. The brim of the pelvis is of an egg-shaped contour; but the posterior aperture has a figure-of-8 or hour-glass outline, from a more than ordinary inward prominence of the bones opposite the acetabulum. The special feature, however, is the thrusting forwards of the pubes, and partly the ischia, leaving a wide interval, therefore, between the buttocks and tail. Their sacro-vertebral angle pretty well agrees with that of a Rhesus, which I compared side by side; but the pelvic angles diverge considerably. In the Rhesus the vertebro-iliac angle is 165°; in the ♀ Formosan 110°, in the ♂ 125°. The ilio-pubic angle of the Rhesus is 105°; of the ♂ and ♀ Formosan 95°. My figures of the pelvic bones of the latter animals, if compared with those I have given of the Bornean and Japanese Monkeys, convey through the eye the distinctions better than numerical data.

I shall only add a few pelvic measurements of *Macacus cyclopis* accessory to the foregoing:—

	Female. in.	Male. in.
Extreme length of the os innominatum	4·6	5·1
Conjugate diameter of the pelvis	2·3	2·15
Transverse diameter of the same	1·6	1·65
Its oblique diameter	2·5	2·2

My statements may be objected to on the ground that a softening of the bones or other diseased condition is the cause of the abnormality from the Rhesus type. It is as well, then, that I should mention that in the female specimen the whole of the skeletal structure is solid, and exhibits no signs of *mollities ossium*. Furthermore, in it the departure from the normal configuration of the Rhesus is most evident. The long bones of the male skeleton, it is true, are more than usually porous and soft; the pelvis, though, is sounder, but not so firm as to be consistent with robust health. But this very fact supports the idea of the pelvic differentiation being a specific mark, and not due to disease; for in the latter, where possibly subject to imperfect ossification, the curvilinear figure presently to be spoken of is less notable.

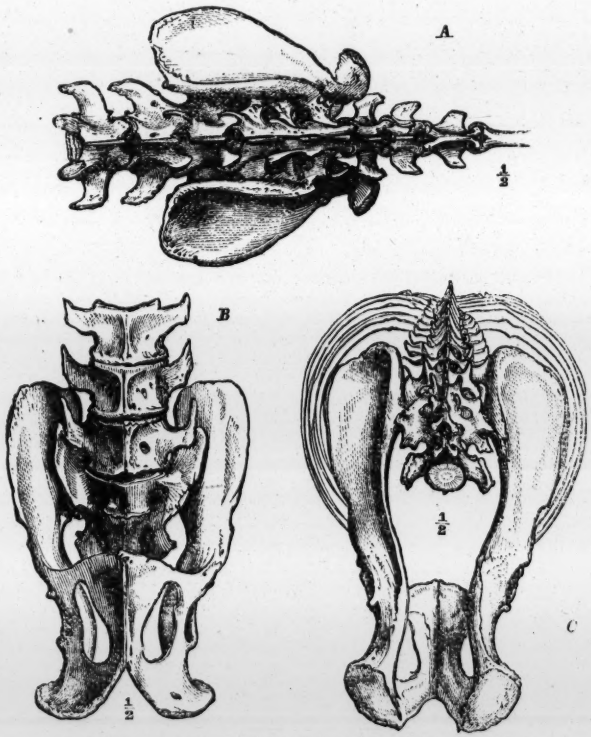
The general character of the spinal column in this case is better seen in the ♀ specimen than in the ♂, simply because it has been retained as a ligamentous skeleton.

In the former there are 7 cervical, 12 dorsal, 7 lumbar, 3 sacral, and 16 caudal—in all, therefore, 45 vertebræ. The latter appears to have the same numbers; but injury to the final caudals prevents me speaking with positiveness.

The neck-, back-, and loin-vertebræ have no special attributes further than that those of the loins posteriorly manifest increment of strength.

The three sacral vertebræ have coalesced; and their inferior sur-

Fig. 2.



Different views of the ♀ pelvis &c. of the same Chinese animal.
A. As seen dorsally and nearly vertically. *B.* Inferiorly, with a posterior inclination. *C.* From behind, the tail being removed.

faces, as a whole, possess greater concavity than in the Rhesus, where flatness is predominant. The most marked feature of the sacrum of

the Round-faced Monkey, however, is the breadth and shape of the lateral wing-like transverse processes. In shape these want that squareness which obtains in the Rhesus; and the anterior process of the first sends forwards a long spicule.

Mr. Mivart* assigns fifteen caudal vertebræ to *Macacus rhesus*—I suppose limiting his remark to the ♂ specimen, No. 4991, in the College of Surgeons' Museum (also *vide* Catalogue, vol. iii.). In one skeleton of the same species in the British Museum, there are eighteen separate elements, their entire length being only nine inches. In the female *M. cyclopis*, with but sixteen vertebræ, their combined measurement is 11½ inches. The proportion borne by the tail to the length of the spine (*vide* Table, p. 777) is as 99·1 to 100 in the ♀, 98·4 to 100 in the ♂ Formosan, and 67·1 to 100 in the true Rhesus. It follows that the tail in the former is both absolutely and relatively longer, and each vertebra stronger, than in that compared.

There is another peculiarity possessed by the Formosan Monkey, which allies it with the Baboons. At the distal end of the first caudal the direction of the tail's long axis alters, being tilted up at an angle of about 140°; thence it extends curvilinearly. The said tilt is not due to imperfect mounting; for the skeleton is a natural or ligamentous one. Moreover the manner of articulation of the bones is conclusive, and unlike what obtains in *M. erythræus*.

Each caudal vertebra is longer than that in advance, until the twelfth is reached, when they successively decrease in size.

A neural spine is well developed in the first and second. In the third, fourth, and fifth a true elevated spine is absent. The neural laminæ, instead, are laterally perforated posteriorly, and reach backwards as a low arch joining the zygapophyses of the vertebræ behind. From the sixth backwards a centrum only is present. Both in *Cercopithecus* and *Hamydryas* the spaces just mentioned are very patent in the corresponding caudals.

Fair-sized transverse processes obtain from the first to the fourth vertebræ. Chevron bones and tubercles for their attachment (*i. e.* hæmapophyses and hypapophyses) are met with in the anterior caudals.

The ribs, as in the Macaques generally, are twelve on either side; and of these, eight are true and four false.

In the female skeleton eight pieces are extant in the sternum; but in the male there appear to be only seven. Mivart (*l. c.*) avers that the number of distinct bones posterior to the manubrium and anterior to the xiphoid cartilage generically varies, but assigns five or six to *Macacus* and *Cynocephalus*. The manubrium is large, and not so thick as the body-segments, although in the male the clavicular portions manifest more than the average solidity.

Before proceeding to take note of the other portions of the appendicular skeleton, I introduce the subjoined tabular data of admeasurements and proportions. Besides the two sexes of the Formosan species, I have added for comparison that of a Rhesus, typical of

* P. Z. S. 1865, p. 562, "The Axial Skeleton of the Primates."

Macacus, as given by Mivart, 'Trans. Roy. Soc.' 1867, tables, pp. 377 to 388 inclusive. The tail is from my own measurement of the same Hunterian specimen, No. 4991. The notes of interrogation are appended where the exact length could not be relied on, from injury or otherwise. Inches and decimals are used, and 100 taken as the standard of proportions.

Table showing relations of Spine and Limb-bones.

	M. cyclopis ♀.		*M. cyclopis* ♂.		*M. erythræus* ♂.	
	Dimensions.	Proportions.	Dimensions.	Proportions.	Dimensions.	Proportions.
Spine (1st cerv. to last sacral)	11·6	=100	13·0	=100	12·8	=100
Tail in length	11·5	99·1	12·8 ?	98·4	8·6	67·1
Entire pectoral limb	12·5	107·7	14·0	107·7	14·8	115·6
Pectoral limb, less the manus	9·5	81·9	9·5	73·0	11·2	87·5
Humerus in length	4·5	38·8	5·1	39·2	5·7	44·9
Ulna in length	5·5	47·5	5·5	43·0	6·2	...
Radius in length	4·7	40·5	...	...	5·5	42·9
Manus in length	3·65	34·4	4·3	33·0	3·6	28·1
Entire pelvic limb	15·2	131·0	15·8 ?	121·5	17·7	138·3
Pelvic limb, less the pes	10·5	90·5	11·3	88·4	12·9	100·8
Femur in length	5·3	45·7	5·9	45·4	6·6	52·0
Tibia in length	5·4	46·5	5·4	43·0	6·2	48·8
Pes in length	5·2	44·8	5·6	43·0	6·0	46·8

It may be gathered from the above approximations that the entire pectoral and pelvic limbs of the Formosan Monkey are both absolutely and proportionally shorter than in the Rhesus. The same obtains in these extremities, minus the manus. It is further noticeable that the female exceeds the male of *M. cyclopis* in the latter proportions. The humerus, radius, femur, and tibia, which respectively are comparable as indicating fore- and hind-limb segments, are all of smaller ratio in the Chinese form. The manus, on the contrary, both absolutely and relatively, is the reverse, or smallest, in the Indian animal; but not so the hind foot or pes.

Reverting for a moment to Mivart's careful observations, it would seem that our Round-faced Monkey, in the proportionate dimensions of fore limb to spine's length, presents closest agreement with Man and *Cynocephalus*. The humerus to spine is again nearer the latter than *M. rhesus*. Manus to spine has a Gorilla-like proportion. The entire pelvic limb is in concord with the Rhesus and *Cynocephalus*, and without the foot is nighest the latter and its fellow. The relations of femur to vertebral column approach quite as much to *Cercopithecus* and *Cynocephalus* as *M. rhesus*. Tibial proportion inclines to the Baboon and *Semnopithecus*; and the foot (pes) is not far out from the latter and the Rhesus, but much longer than in *Cynocephalus*.

Although not so strikingly obvious as is the shape of the pelvis, yet the long bones of the fore and hind extremity have characters of interest worth mentioning.

The following points are clear, irrespective of relative dimensions:—The posterior (vertebral) border of the scapula is more rounded than in the Rhesus Monkey, in which latter the inferior angle is produced. In the Formosan species the acromion process is also flatter, and not so laterally compressed as in the other.

As regards humerus, *M. cyclopis* has much stronger and prominent external and internal bicipital ridges, and the latter incurved, whereas it is straight in *M. rhesus*. In the former animal the deltoid eminence and the plate of the external condyloid ridge are relatively and absolutely great; and their production gives an irregular curvilinear outline to the long axis of the shaft. Moreover there is in the Chinese Monkey a very marked forward bend of the upper segment of the humeral shaft; and in it the head of the bone has a more backward set, with deflection of its lower border.

The above remarks respecting prominence of ridges apply likewise to the ulnar muscular lines; and hence the shaft of this bone appears less compressed sideways than it does in the Rhesus. There is certainly a greater anterior arching in the shaft of the radius in *M. cyclopis*, more especially its lower moiety; and this causes the interosseous space to be sensibly wider.

In the femur of Mr. Swinhoe's species the lower half of the shaft has a very appreciable forward bend—the reverse of the humerus, therefore, so far as its being at the distal and not proximal end. Moreover the articular surface of the femoral portion of the knee-joint is peculiar, inasmuch as it is thrown back somewhat, and the condyles directed upwards behind, the contrary (or a forward inclination of the articular face) being the character of the true Rhesus. Other things being equal, I may add that the shaft of the femur, especially its upper fourth, is a stouter pillar in the Chinese animal than in that compared.

A semi-twist or posterior bend on the shaft's long axis pertains to the upper fourth of the tibia, its head in this way being coadapted to meet the altered articular facies of the femur. It results, then, that the knee has more angular definition and prominence, and an inferior posterior obliquity of apposition, in the Formosan than in the Indian Monkey. The patella abides by the change, its inner concavity being much scooped, to fit the bones and cartilages it glides upon. In the Rhesus the fibula is notably a straight bone; in the round-faced species there is greater sinuosity of the ridges, which gives a curvilinear aspect, without great change of the bone's axis.

I own that I feel puzzled to ascribe characters to the skull which would trenchantly separate the Round-faced from the Rhesus Monkey. In the latter, as a series of specimens prove, the changes in contour from the young to the adult stage are very surprising. In fact recognition of the extremes is not easy, unless traced step by step from one to the other. I have compared the skulls of our types of the male and female Formosan with nearly every one of the rich

collection of Rhesus crania in the British Museum, and, taking age and other attributes into consideration, am reduced to the following weak marks of diagnosis:—

In the ♂ *M. cyclopis* the nasals are a trifle broader than in *M. erythræus*. The ascending process of the malar bone of the former is rather wider, and its horizontal limb perceptibly deeper than in the latter. In the ♂, but not in the ♀, Formosan species there is somewhat more fulness of the maxillo-premaxillary region, contrasted with the same in the Indian form. Superiorly the skulls of the above two first-mentioned animals appear to have, rather than absolutely have, greater length to breadth. The inferior aspect of the petrous portion of the temporal bones of the ♂ of *M. cyclopis* is less prominent than that of the ♂ *M. erythræus*, but is equal to the female of the latter.

Thus there are no very positive points of cranial differentiation discernible. Even the above evince instability when the ♀ sexual differences of Swinhoe's animal are added as a supplement; to wit, the face is narrower, and the ridges &c. are less prominent. On the contrary, the remarkably abnormal pelvis and shorter limb-bones &c. are weighty, and, indeed, to me conclusive argument in sustaining the claim of the Formosan Monkey to be specifically distinct from the Rhesus.

I append a series of measurements of the male and female skulls, which, if not exhibiting specialities, may be useful for future comparisons:—

	♂	♀
Extreme length, præmaxillæ to occiput	4·7	4·2
Greatest width across the malar arches	3·35	2·9
Length, cranial axis, supraorbitals to occiput	3·55	3·2
Transverse cranial diam. at the squamosals	2·4	2·9
Frontal width, groove behind orbits	1·9	1·9
Vert. height, mid. sag. suture to ant. foram. mag.	2·2	2·0
Depth, mid-frontal to ditto	2·3	2·2
Extreme height with the mandible	3·42	3·2
Face, supraorb. ridge to tip of præmaxillæ	2·2	1·92
Distance, supraorb. ridge to end of nasals	1·18	1·0
Greatest orbital width	2·8	2·5
Breadth, maxillæ oppos. 2nd premolars	1·5	1·3
Palatal length	1·9	1·65
Dist. between posterior nares and foramen magnum	1·5	1·3
Width between the postglenoidal tubercles	2·4	2·35
Mandible in extreme length	3·2	2·85
Its vertical height at coronoid process	1·75	1·75

MACACUS CYCLOPIS, Swinhoe.

Characters. External:—Fur thick, wooly, and more slate-coloured than in the Rhesus. Tail about a foot long, hairy, with a black line along the top. Head round; ears small, feathered; face flat; forehead naked; dark-whiskered cheeks; strong, ruffle-like beard. In ♀, callosities and genitalia periodically enormously developed. Skeletal:—Great curvature of the pelvis, and especially of

pubis to ilium; angulation of the tail at its root; limbs somewhat shorter than in the Rhesus; shaft of humerus bent forwards above; lower end of femur and upper end of tibia with a backward bend, giving unusual prominence to the knee.

8. Observations on the Macaques.—IV. The Japanese Monkey. By Dr. JAMES MURIE, F.L.S., F.G.S., &c.

[Received June 4, 1872.]

"La Macaque que nous publions aujourd'hui nous présente une de ces nouvelles combinaisons de caractères qui ne nous permet de la rapporter à aucune autre espèce de son genre, et qui lui donne une existence spéciale que ne ferait, sans doubte, que confirmer son étude plus particulière et la connaisance plus detaillée, plus exacte de ses organes et de son naturel" *. These words preface F. Cuvier and St.-Hilaire's description of the "Macaque à face rouge," their *Macacus speciosus*. A good illustration accompanies the text. MM. Duvaucel and Diard are credited with having sent home the new animal.

Temminck, in his 'Fauna Japonica,' besides sundry remarks, in correction of Cuvier as to its habitat, agrees as to its specific distinction, though regarding it as truly belonging to the genus *Inuus*. A comparison with *I. ecaudatus* follows, the exterior and skeleton being noted; but no mention is made of its internal anatomy. Two plates are devoted to portraying the old and young animals, in large views of the head (fore face and profile), the buttocks, the feet, and the skull in several views.

Notwithstanding the foregoing labours, and the fact that the species has not been questioned, there still remain a few points of interest worthy of special mention. What Cuvier said, as above quoted, is but partially true; for Geoffroy's *Macacus arctoides* approaches closely in several respects. A fuller comparison of these two forms is now, I believe, necessary, especially as Dr. Anderson's notices† of the latter (his *M. brunneus*) reveal peculiarities partly shared by its congener. Temminck's figures of the young and adult crania of the Japanese species (*M. speciosus*) preclude the necessity of my giving illustrations; but to his remarks and comparison with the Magot I may add a commentary, besides fresh observations.

The male investigated by me lived in the Society's menagerie a few years, dying ultimately of tuberculosis. Its skeleton is preserved in the British Museum.

As respects the dentition of the skull, the hindermost molars appear as if about to issue from their alveolar sockets, but are not perfectly irrupted. The upper canines are smaller in size than those of the Rhesus or Pig-tailed Monkey about the same age. The diastemata are restricted, and the backward obliquity of the first lower premolar less marked. Hence the dentition as a whole is of a more uniform

* Hist. Nat. des Mam., Feb. 1825, tom. i. pl. 46.

† See P. Z. S. 1871, p. 628, and 1872, p. 203, pl. xii.

character than in the longer-tailed Macaques, but does not differ in numbers.

In the upper view of the adult skull shown in the 'Fauna Japonica' (pl. ii. fig. 1) the breadth to length and the rotundity of the parietal region are greater than in our specimen. As a consequence the skull does not offer that remarkable dolichocephalic shape which notably pertains to that here described. In this, length is preponderant, and the breadth at the coronal, parietal, and occipital regions subequal. The front rises high and continues nearly level to the occiput, where it is round and full prior to shelving towards the foramen magnum. Temminck's figure compared with this specimen is not so elevated forwards, and the inferior occipital face is longer.

The coronal suture in ours is more angular than semilunar. The nasals are narrow, long, and not so depressed as in *M. maurus*. The face is fairly prognathous, the maxillæ and præmaxillæ narrowing forwards so as to give a somewhat feminine cast. Malar arches moderately expanded. The superciliary ridge is not prominent, though full; and the orbits are high rather than broad, with a rounded upper angle. Petrous portion of the temporal is not inflated, but has a process anteriorly. Auditory canal full-ridged.

As to the mandible, the symphysial division rises obliquely forwards; the angle is but slightly rounded; and the ramus has a rearward tilt. The bone altogether is stout; and the posterior part of the symphysis is lengthened by a bridge of bone to which probably the digastric muscles are attached.

Cranial measurements.

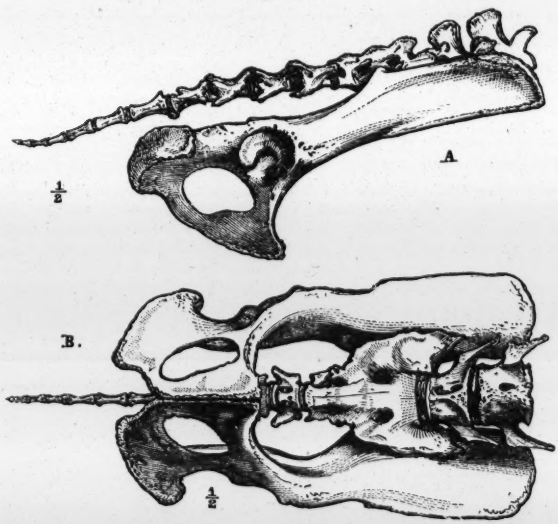
	M. speciosus. inches.	*M. inuus.* inches.
From front of præmaxillæ to occiput=extreme length	4·5	5·0
Diameter of malar arches=extreme width	3·0	3·5
Long cranial axis, or from supraorbital ridge to occiput	3·15	3·35
Transverse cranial axis, or diameter at squamals	2·3	2·4
Width at frontal behind the orbits	1·85	1·85
Height in a vertical line striking the middle of the sagittal suture to the anterior edge of foramen magnum	2·1	2·3
Height, vertical line dropped from middle of frontal to lowest part below	2·4	2·4
Greatest height of skull with the lower jaw resting on a table	3·5	3·8
From supraorbital ridge to end of præmaxilla	2·3	2·65
From the lower border of nasals to supraorbital ridge	1·3	1·35
Width between external edges of orbits	2·4	2·8
Diameter of maxillæ, line cutting second premolar	1·4	1·4
Palate, from front of præmaxillæ to post. nares	1·7	1·95

	M. speciosus. inches.	*M. inuus.* inches.
Cranial base between post. nares and anterior margin of foramen magnum	1·45	1·5
Width betwixt the postglenoidal tubercles ..	2·2	2·7
Mandible, extreme length of bone.....	3·05	3·5
Height at coronoid process	1·6	2·2

The spinal column with and without the tail is longer than in the Bornean Monkey (*M. maurus*). The vertebræ are not so strong as in it—a circumstance not due to difference of age; for, judging by the dentition, they are on a par in this respect. The several vertebral processes seem finer in their proportions; and the lumbar transverse ones are decidedly shorter and turned more sharply forwards than in *M. maurus*. Vertebral numbers 7 C., 12 D., 7 L., 3 S., and 11 C.,=40. Ribs 24 in all.

The sacrum has the flatness, both superiorly and inferiorly, common to the genus. The united bodies of the three vertebræ composing it are barely so long as the transverse diameter at its

Fig. 1.



Sacro-caudal vertebræ and pelvis of *Macacus speciosus* ♂.
A. Outside view. *B.* Seen inferiorly.

middle, or respectively 1·25 and 1·45 inch; but if the length from the anterior point of the sacro-iliac synchondroses be taken, it exceeds the breadth by 0·3 inch. The spine of the first sacral is well marked

and coalesces with that behind, which is small; the third spine is obsolete.

Mr. Mivart has already * pointed out that in *Macacus speciosus* (No. 1083*a* in B. M.) the third caudal is scarcely, if at all, longer than the second, yet the fourth is longer than the third; so that although there are only ten [eleven] caudal vertebræ, they *do* increase in length backwards, thus differing from *Inuus*.

The pelvis reiterates the more ordinary Macaque characters. The ischial tuberosities are relatively narrow, and placed at, mayhap, a trifle wider angle than is usual. Obturator foramen very large; and this induces a narrowing of the ischial plates, which otherwise are short and more vertical than in *M. erythræus*.

The following are some of its proportions and angles of inclination:—

Os innominatum 4·9 inch long, or as 37·7 to 100, the latter being equivalent to the spine. Pelvic diameters, conjugate 2·25 inch, transverse 1·9, and oblique 2·9 inches.

The femur is longer and has a stouter shaft than has its short-tailed congener, the Bornean Monkey. The shaft besides is somewhat flatter than in the latter, the Formosan, and the Rhesus Monkeys. There is an unusual incurvation of the tip of the great trochanter; and this causes the trochanteric fossa to be partially hidden, helped, moreover, by an additional tubercle of bone. The head is set nearly at right angles to the long axis of the femoral shaft.

I have spoken of an obliquity of the condyles in *M. cyclopis*, and of the tibia's head being inclined to this; in *M. speciosus* this does not obtain, the knee-joint resembling the majority of the genus.

Among the bones of the fore limbs and chest there is little requiring mention. The clavicles acromially are much curved; and the sternum has a broad thin manubrium.

	M. speciosus.		*M. inuus.*		*M. maurus.*	
Spine, 1st cervical to last	Dimen.	Propor.	Dimen.	Propor.	Dimen.	Propor.
sacral.....	13·0=100		15·8=100		11·3=100	
Tail in length.....	3·8	29·2	1·5	9·4	1·7	14·1
Pectoral limb, less manus	10·4	80·0	12·0	75·9	10·0	88·5
Humerus in length....	5·1	39·2	5·8	36·7	4·9	43·4
Ulna in length	5·8	44·6	6·6	41·7	5·4	47·7
Radius in length	5·3	40·7	6·0	37·7	5·0	44 2
Pelvic limb, less the pes	11·1?	85·3	13·2	83·5	10·5	92·9
Femur in length.....	5·8	44·6	7·0	44·3	5·3	46·8
Tibia	5·6	43·0	6·4	40·5	4·9	43·3

My notes on the visceral anatomy I shall throw together in a summary manner. Omentum thin and almost free from fat; attached from the spleen along the great gastric curvature to beyond the pylorus, extending thence to the cæcum. Spleen trapezoidal in figure; length 2, and breadth 1 inch; covered by the stomach,

* P. Z. S. 1865, p. 563, footnote.

excepting a slight portion of the right corner, which is free. The right kidney is placed one inch higher than the left. Heart normal. Lungs, left bilobed, right quadripartite, the middle segment of the three largest is tongue-shaped, whilst the smallest one of all four (*lobus impar*), which lies in advance, is partially incised into two triangular lobules. Liver in breadth $6\frac{1}{4}$, and in length or antero-posterior diameter $4\frac{1}{4}$ inches. The main divisions of this organ are into a right and a left lobe of about equal size, and a central or cystic lobe larger than either of these. The two former are not cleft; but the latter has an umbilical marginal fissure and pit for the round ligament, with to the right of this the usual but shallow groove lodging the gall-bladder. The lobus caudatus is bayonet-shaped and $2\frac{1}{2}$ inches long. The lobus spigelius is much smaller, flattened, and oval pointed. The ductus communis choledochus enters the intestine 1 inch beyond the pylorus.

Small intestines 94 inches long, of nearly uniform ($\frac{3}{4}''$) diameter throughout. Large intestines, including cæcum, 35 inches; the gut altogether, therefore, having a length of 10 feet 9 inches. The cæcal appendage is a simple and wide dilatation, being almost as wide as long, $=2\frac{1}{4}$ inches. In the great gut there is a fibrous band on either side, and a number of pouched sacculi for one third of its length, the constrictions of the remainder portion being irregular and very small. Diminution and narrowness of the tube commences about half a foot beyond the cæcum.

Stomach of nearly an ovoid figure when distended, the gullet entering midway between the cardiac and pyloric ends. The narrow portion towards the pylorus is considerably recurved upon the lesser curvature. Measurements in the inflated condition:—great curvature from gullet round to the narrowing of the pyloric extremity $9\frac{1}{2}$ inches; lesser curvature $1\frac{3}{4}$ inch.

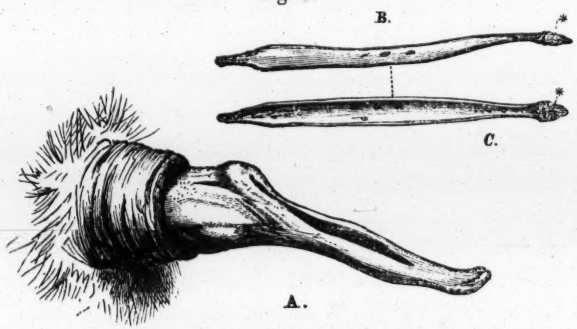
The ♂ generative apparatus has quite as remarkable a construction as that of *Macacus arctoides* (=*M. brunneus*), recorded by Dr. Anderson (*l. c.* fig. 3). This organ in *M. speciosus* is quite $2\frac{1}{2}$ inches long when erected; and in this condition the reflected præputium occupies about $\frac{3}{4}$ inch of the root and body, with a diameter of about $\frac{1}{2}$ inch. For another $\frac{1}{2}$ inch or so the penis is narrower but still relatively thick, and surmounted by a swelling or nodular hardish prominence of the corpus cavernosus. Thence the glans is narrow, straight, and tapering. Thus far there is a certain similarity to what obtains in *M. arctoides*; but unlike the male intromittent organ of that Burmese Monkey, the glans in the Japanese Monkey is smooth-surfaced and not beset with spines; moreover the ossicle differs, judging from Dr. Anderson's account.

The bone of the penis in *M. speciosus* has a length of 2 inches, and anteriorly is tipped by a short, flat, triangular cartilage, which terminates in a fibrous cord mingling with the septal tissue, narrowing at either end; the ossicle, little more than $\frac{1}{10}$ inch in greatest diameter, presents the form of a cannula, the groove placed inferiorly. The bone is not perfectly straight, but has a gentle curve, especially at its anterior third, which is narrowed and but slightly fluted. The

upper surface is more or less ridged along its course. The entire ossicle in figure and density may be compared to a small quill pen, wherein runs the corpus spongiosum.

In the Rhesus Monkey the bone of the penis is relatively solid and less than half in magnitude of that here described.

Fig. 2.



Male generative parts of the Japanese Monkey.

A. Penis, *ad nat*. *B*. The bone, seen laterally. *C*. Its inferior grooved aspect, also of natural dimensions; the * in both denotes the cartilaginous apex.

Previously to dissecting this Monkey I noted that the general colour over all the body is marly brown, produced by banded hairs of brown and black; the darkest tint appears to be along the middle of the back. Abdomen, chest, and the inner surface of the limbs are more sparsely supplied with hair, and this is shaded off to a rufous brown. Face bare in great part; but there are a few short hairs of the same colour as the body situate at the posterior edge of the cheeks, and some straggling hairs around the upper lip, besides a moderately strong yellowish-brown beard. The skin of the nose and that of the lower lip incline to dark brown; but the remainder of the face in the living animal is usually of an intense red or purple hue. This, I may observe, is due to great vascularity; for it diminishes or is very much subdued in the dead body.

There is a certain character given to the physiognomy by the eyebrows, which meet in the middle line, these being composed of scattered stiff erect hairs, each about an inch long. Upon the frontal region of the cranium only very short hairs are present, so that it has a bald look. Towards the occiput they increase in number and length, and close to the neck average 3 inches long, becoming at the same time very dark in hue. I may as well mention here that the hirsute covering of the shoulders and back agrees with the neck, though shortening on the loins, as also on the limbs. A close examination revealed little or no underfur.

Respecting the aspect of the head itself, it struck me as comparable with a beetle-browed human being, partly on account of the dispo-

sition of the hairs, and partly because of its upper or coronal superficial flatness, with the superciliary ridges projecting over the orbits. The face is prolonged forwards, causing the muzzle to be prominent; the nostrils are patulous. The ears are small, with a bare space round them, but a pencil of scattered hairs start from the concha.

Subjoined are the measurements of the head in the fresh condition:—From nape of neck to the vertex $2\frac{1}{2}$ inches; occiput to frontal or supraorbital ridge $6\frac{1}{8}$ inches; from the middle of one ear to the other following the curve $6\frac{1}{2}$ inches; breadth between the malar prominences, in a horizontal line, $3\frac{1}{4}$ inches; distance between the centre of the two eyes $1\frac{1}{4}$ inch; vertical height from the superciliary ridge to the lower border of the mandible $3\frac{1}{3}$ inches.

Dentition: incisors $\frac{4}{4}$, canines $\frac{2}{2}$, premolars and molars $\frac{4}{4}$, = 20.

The pollex or thumb is well developed, and almost an inch long. The two middle digits are subequal, but the second and fifth shorter, the last being smallest. The palm has a length of $4\frac{1}{2}$ and a breadth of $1\frac{1}{2}$ inch. As regards the sole of the pes, from heel to mid toe-nail is $6\frac{1}{4}$ inches, at its middle $1\frac{1}{4}$ and at the heel 1 inch across. Other bodily measurements which I may notice are:—

Length from back of the neck to the root of the tail 17 inches.

Girths: thorax 16, and abdomen 12 inches.

From shoulder to elbow 7, and elbow to wrist $6\frac{1}{2}$ inches.

From hip to knee $6\frac{1}{2}$, and knee to sole $7\frac{1}{2}$ inches.

The short tail has but little hair on it, excepting at the sides of the root. This caudal appendage, indeed, is remarkable on account of its brevity, being no more than $1\frac{3}{4}$ inch in extreme free length, taken from opposite the ischial tuberosities as its root of origin.

The results of my researches on the anatomy of the Japanese Monkey do not coincide with those of M. Temminck. As I hinted, he regards it as specifically distinct from the Magot (*Inuus*), but looks upon it as belonging to that genus. He observes there is great resemblance between them—but among other things notes that *I. ecaudatus* has twelve, and *I. speciosus* thirteen ribs, that the former is tailless, the latter has five caudal vertebræ; the Magot he considers has the longest femur and humerus of the two, and the Japanese Monkey less facial prominence (prognathism). I grant there is uncommon likeness in cranial type between the two; but as to the caudal vertebræ in both, De Blainville's, Mivart's, and my own researches are at variance with Temminck's. Again, although the limbs of the European form are absolutely longer than the Japanese, the latter, as the above table shows, has them proportionally the longer. Instead, therefore, of looking upon the Eastern form as a second species of the genus *Inuus*, I am inclined to the opinion that *Inuus* ought to fall under *Macacus*, as Fred. Cuvier classed it. Thus among the Macaques a series from very short- to long-tailed fellows obtains, *M. maurus*, *M. ochreatus*, and *M. speciosus* leading onwards from the remarkable caudal abbreviation witnessed in the so-called Barbary Ape. When I have treated of some other of the rarer kinds of Macaques, material for which I have in hand, I hope in a future communication to review the group, and with special reference to their geo-

graphical distribution &c. In conclusion, I may add that the live *M. arctoides* (=*M. brunneus*) in the Society's Gardens, as far as I could notice, does not in strictness sit on its tail (as Dr. Anderson remarks) any more than do the three last mentioned somewhat longer-tailed species. This appendage is necessarily thrust to one side of the buttocks; and whether long or short its root is consequently liable to be rubbed and chafed. The shorter it is, the curl or twisting to the side is less apparent, though, on close watching, manifest.

9. Note on the Tongue of the Psittacine genus *Nestor*.

By A. H. GARROD, F.Z.S., Prosector to the Society.

On the death of a specimen of *Nestor hypopolius* in the Society's Gardens, a short time ago, Mr. Sclater kindly directed my attention to the peculiarity of its tongue, and referred me to Dr. Finsch's work on the Parrots, where *Nestor* is placed among the *Trichoglossinæ*, though the author states that he is not possessed of any very precise information on the subject.

Mr. Gould, in his 'Birds of Australia' (vol. v. plate vi.), partly describes the tongue of this bird, and shows that it is not that of a Lory; but he has omitted to note its chief peculiarity.

Dr. Buller, in the recently published 1st part of his 'Birds of New Zealand,' has also described the tongue quite correctly, though not much in detail—but nevertheless places *Nestor* close to the Lories, mentioning that this affinity was first shown by MM. Blanchard and Pelzeln.

As, however, the tongue of *Nestor* does not in reality resemble that of the *Trichoglossi* at all, it may be of interest to describe it more fully.

As far as I have had opportunity of observing, in all Parrots the fleshy tongue ends anteriorly by a dilated portion, supported on a narrower neck. This tip is much like the end of a human finger, as mentioned by most observers: and its function is similar also; for it is employed by the bird as a third prehensile organ in connexion with the upper and lower beak, any solid substance being held by the tongue and upper beak, while the mandible is freed to give another bite.

Continuing the simile of the finger, the tip is directed forwards with the nail-like portion downwards, the part corresponding to the free edge of the nail appearing along the lower margin of the anterior rounded surface.

This unguis, or nail-like portion, appears to me further to resemble a nail in that its anterior edge is not quite regular and is free, while the posterior margin is continuous with the neighbouring epithelium, which is almost enough to show that it grows forwards, and is worn down, as is a nail, by constant contact with foreign substances.

In the typical Parrots this unguis of the tongue is broader than long, horny in texture, semicylindroid, with its lateral margins extending up the sides of the organ and encroaching on the borders of the superior surface for a short distance; not imbedded at the sides as is a nail. Its anterior border is nearly straight.

In the *Trichoglossi* this horny plate is also present, and is similarly constructed; but on the superior surface of the tongue, between the lateral edges of the unguis, in the part which in others is covered by a smooth longitudinally plicated epithelium, there is an arrangement of retroverted papillæ forming a spinous covering; and their

Fig 1



Fig.2



Fig.4



Fig. 5



Fig.3



Fig. 1. Head of *Lorius tibialis*, showing the bird stretching out its bill for food, in which case, the tongue being protruded, the spines covering the superior surface of its apex are directed forwards instead of being recurved and inconspicuous, which is the case when it is at rest.

Figs. 2 and 3. Inferior and superior views of the tongue of *Nestor hypopolius*, showing the fringe of hairs which springs from the anterior border of the margins, and which extends forwards beyond the tip.

Figs. 4 and 5. Inferior and superior views of the tongue of *Stringops habroptilus*, which is like that of the typical Parrots.

mechanism is such that when the tongue is protruded beyond the mouth to grasp any object, the papillæ stand upright or are even directed somewhat forward.

In *Nestor* there are no papillæ of this description, but the tongue is here, as Dr. Buller says, "soft, rounded on the edges, with a broad central groove," and it is as smooth as in other Parrots. Therefore

the Ka-Ka Parrot cannot in this point be said to approach the *Trichoglossi* (badly so called).

The peculiarity of the tongue of *Nestor* consists in the fact that the anterior edge of the unguis, always free (though for a very short distance) and jagged, as mentioned above, in the other birds of the class, is here prolonged forwards, beyond the tip of the tongue, for about $\frac{1}{10}$ inch as a delicate fringe of hairs, with a crescentic contour. This fringe seems to result from the breaking up into fibres of the forward-growing plate, which is always marked by longitudinal striations, clearest anteriorly, the result of unequal density and translucency of the tissue composing it, though on making a cross section I was not able to find any of the longitudinal papillary ridges which are present in the human nail and which the striation led me to expect. The unguis is also longer than broad, and very narrow considering the size of the bird, as is also the whole tongue, though the length is greater than in others of the class. In the living bird the mouth is moist, as in the Lories, and not, as in the Cockatoos and others, dry and scaly.

From these considerations, and a comparison of the accompanying drawings of the tongues of *Stringops*, *Nestor*, and *Trichoglossus*, it is evident that the structure of this organ would lead to the placing of *Nestor* among the typical Parrots, though an aberrant one, and not with the *Trichoglossinæ*; and other points in its anatomy favour this conclusion.

November 5, 1872.

The Viscount Walden, F.R.S., President, in the Chair.

The Secretary read the following reports on the additions to the Society's Menagerie during the months of June, July, August, and September, 1872 :—

The total number of registered additions to the Society's Menagerie during the month of June 1872 was 211; of which 72 were by birth, 25 by presentation, 92 by purchase, and 22 were received on deposit. The total number of departures during the same period, by death and removals, was 94.

The most remarkable additions in June were :—

1. A fine pair of Vulturine Guinea-fowls (*Numida vulturina*), presented, June 14th, by Dr. John Kirk, C.M.Z.S., H.B.M. Consul at Zanzibar. Writing from Zanzibar (August 3rd) Dr. Kirk informs me that this Guinea-fowl has a more northern range than he had previously supposed, being essentially a Somali-land species. Dr. Kirk doubts whether it is ever found south of the river Juba, the information that it was to be met with at Lamoo (P. Z. S. 1867, p. 953) not resting on sufficient authority.

2. A specimen of a new species of small Parrakeet of the genus *Loriculus*, from Cebu, Philippine Islands, purchased June 18th, of Dr. A. B. Meyer.

In April 1871 we obtained from a dealer in Liverpool a pair of

the same species of Parrakeet. These I determined as *Loriculus culacissi**; and when Dr. Meyer showed me his bird I told him that I believed it to be of that species. Dr. Meyer, however, was of a different opinion, and in order to settle the question was kind enough to allow me to examine the specimens of *Loriculus* in his collection made in the Philippines. On comparing Dr. Meyer's skins with the descriptions given in Dr. Finsch's monograph, I found that Dr. Meyer was undoubtedly correct. Three species of *Loriculus* were represented in his collection, namely *L. culacissi* from Luzon, *L. regulus* from Negros and Panay, and the present bird, which appeared to be undescribed, from Cebu. Under these circumstances I sent a short notice of the last-mentioned species to 'The Ibis' for July last, and proposed to call it *L. chrysonotus*, from its golden back †.

The total number of registered additions to the Society's Menagerie during the month of July 1872 was 122; of which 31 were by birth, 57 by presentation, 17 by purchase, 5 by exchange, and 12 were received on deposit. The total number of departures during the same period, by death and removals, was 94.

Almost the only arrival of special interest was twelve Natterer's Bats (*Vespertilio nattereri*, Kuhl), presented, July 19th, by Lord Lilford, F.Z.S. We vainly endeavoured to keep these animals alive in captivity: they all died within a few days.

The total number of registered additions to the Society's Menagerie during the month of August 1872 was 115; of these, 20 were by birth, 45 by presentation, 29 by purchase, 4 by exchange, and 17 were received on deposit. The total number of departures during the same period, by death and removal, was 141.

The most noticeable of the additions were:—

1. A female two-horned Rhinoceros, stated to have been captured in Malacca, purchased of Mr. W. Jamrach, August 2nd, for the sum of £600. As soon as this animal arrived in the Gardens it became obvious that it was of a different species from the female two-horned Rhinoceros previously purchased of Mr. Jamrach‡, and that consequently there must be two species of this form of Rhinoceros in existence.

On reference to authorities it appeared evident to me that the animal last received was the true *R. sumatrensis* § of previous writers.

This might have been expected from the locality in which it was obtained, the fauna of Malacca being notoriously similar to that of Sumatra.

Under these circumstances it became, in my opinion, necessary to give a new name to the animal previously received from Chittagong; and in a communication made to Section D of the British Association at Brighton on the 16th of August last, I accordingly proposed to call it *Rhinoceros lasiotis* ‖, from the peculiar long hairs which

* See P. Z. S. 1871, p. 479, and Rev. List of Vert. p. 202.

† See Ibis, 1872, p. 323, pl. xi. ‡ See *antea*, p. 493, pl. xxiii.

§ *Rhinoceros sumatrensis* of Cuvier, Règne An. i. p. 240 (1817), founded on Bell's description of an animal killed in Sumatra, published in Phil. Trans. 1793. Raffles in 1820 named the same animal *R. sumatranus* (Linn. Trans. xiii. p. 268).

‖ See 'Times' of August 19. p. 5; and 'Athenæum,' August 24, p. 243; also 'Nature,' October 24, p. 518.

Fig. 1.



Right ear of *Rhinoceros lasiotis*.

border the outer edge of the ear-conch (see fig. 1), and which are of themselves sufficient to render the animal easily recognizable from *R. sumatrensis*. Dr. J. Anderson, in his excellent description of our Chittagong animal under the name of *R. sumatrensis* (*antea*, p. 130), has specially commented on this peculiarity, but, not being aware that he was dealing with a different species, was inclined to think it might be individual. In *R. sumatrensis* (verus) (fig. 5, p. 793) the ears are filled with short bristly hairs internally, but there is no special elongated fringe on the outer edge. In *R. lasiotis* (fig. 3, p. 792) the interior of the ear-conch is nearly naked.

Our Sumatran Rhinoceros, although an adult or rather aged animal, was much smaller in bulk than the hairy-eared, and at least 6 inches less in height at the shoulder*.

Another point of distinction between the two animals is the longer tail of *R. sumatrensis*, which is only covered by short black straggling bristles. In *R. lasiotis* the tail is shorter and tufted, terminating in long brown hairs.

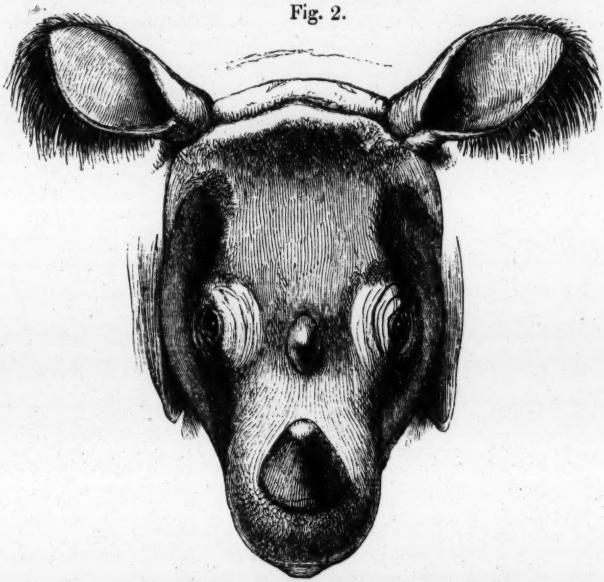
The distance between the ears is much greater in *R. lasiotis* than in *R. sumatrensis*, as will be seen by the accompanying drawings (figs. 2 and 4, pp. 792, 793); and there can be no doubt that the skulls of the two species, when they can be compared, will exhibit corresponding differences.

The skin of *R. lasiotis* is smoother and paler in colour; the hairs are longer and finer and of a rufescent hue, giving the animal a general colouring of lightish brown. In *R. sumatrensis* the skin is much darker and the hairs are short and bristly.

* Mr. Bartlett's measurements of our five Rhinoceroses (August 24, 1872) are as follow:—

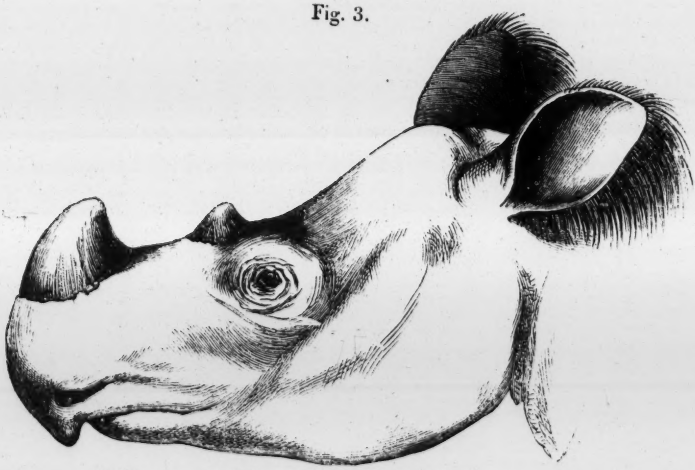
	ft.	in.	
1. *R. unicornis* ♂	5	4	height at shoulder.
2. „ „ ♀	5	2	
3. *R. sumatrensis* ♀	3	8	
4. *R. lasiotis* ♀	4	4	
5. *R. bicornis* ♂	4	6	

Fig. 2.



Front view of head of *R. lasiotis*.

Fig. 3.



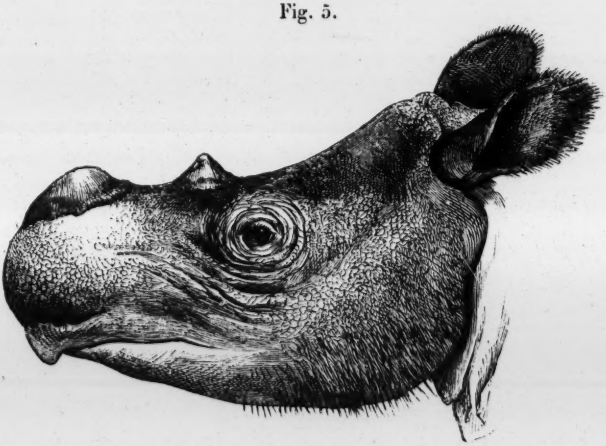
Side view of head of *R. lasiotis*.

Fig. 4.



Front view of head of *R. sumatrensis*.

Fig. 5.



Side view of head of *R. sumatrensis*.

These differences are well shown in the water-colour drawings of these animals by Mr. Wolf, which I exhibit, and of which I hope hereafter to publish copies in the Society's 'Transactions,' together with some notes on the species of Rhinoceros living in the Society's Gardens.

Mr. Smit's figure of the Sumatran Rhinoceros (Plate LXVII.) may also be compared with that of *R. lasiotis* (Plate XXIII., p. 494) already given in the 'Proceedings.'

Lastly I have to add with regret that our Sumatran Rhinoceros did not live long in the Society's Gardens, but died very suddenly on the night of the 21st of September.

Our Prosector has made notes on the anatomy and osteology of this animal, which he will shortly bring before the Society. In the mean time I have compared the skull (which I now exhibit) with the skull of the Sumatran Rhinoceros in the Museum of the College of Surgeons, received from Sir Stamford Raffles, with which it agrees quite sufficiently, although the nasal portion is decidedly broader in the present specimen. Mr. Garrod, however, informs me that the present skull agrees perfectly with the adult skull of *Rhinoceros sumatrensis* from Pegu in the British Museum.

The present skull is evidently that of a very old animal, the lower incisors having entirely disappeared. Professor Flower has informed me that the same is the case with a skull of *R. sumatrensis* in the Brussels Museum.

The skin and skeleton of this animal have been purchased of the Society by the Trustees of the British Museum.

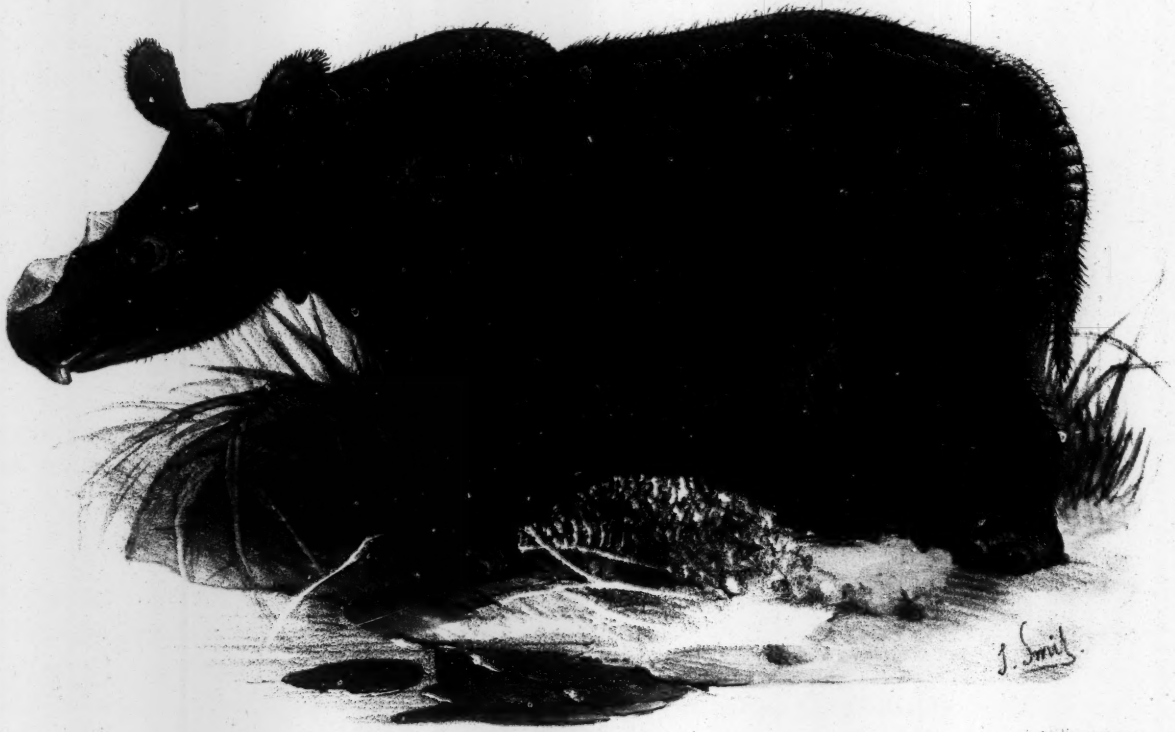
I may remark that the stuffed specimen of the Sumatran Rhinoceros in the Gallery of the British Museum (which originally came from the Leyden Museum) is evidently a young male of the same species. I observe that it has recently had its name changed to *Ceratorhinus crossii*; so that it is probable that our specimen will have this name applied to it when placed in the British Museum. But even should it be proved that the *Rhinoceros lasiotis* is the true *sumatrensis* (as Dr. Gray has maintained*), it would not, I think, under any circumstances, be right to apply the term *crossii* (founded on what is probably only an abnormal horn) to this species.

2. A female of what appears to be a small form of the Mantchurian Deer (*Cervus mantchuricus*), inhabiting Japan, received in exchange from the Jardin d'Acclimatation of Paris. On the 18th of March last we received a male of this same animal as a present from Mr. T. R. Wheelock of Shanghai. Having been informad by the donor that this Deer was from Japan, I at first referred it to *Cervus sika*, the only described species of *Cervus* of that country. But this was decidedly an error; that is, the species is decidedly different from that which we call *Cervus sika*†, and does not much differ from our *Cervus mantchuricus*, except in size, standing only 2 ft. 8 in. in height at the shoulders, instead of 3 ft. 8 in., and thus being intermediate between *C. mantchuricus* and *C. pseudaxis* sive *taëvanus*.

A second female apparently of the same form, but differing slightly

* Ann. Nat. Hist. ser. 4, vol. x. p. 207. "On the double-horned Asiatic Rhinoceros." See also my remarks, *ibid.* p. 298

† *Cf.* Trans. Zool. Soc. vii. p. 346.



RHINOCEROS SUMATRENSIS ♀

28.0073

in size and markings, has been kindly lent to us by the Royal Zoological Society of Amsterdam; so that we have now a buck and two does of this form of Deer in the Society's Gardens.

3. Two male and one female Gambel's Colins (*Callipepla gambelli*), received in exchange August 29th. This beautiful species has never reached us alive before; and the female was not known to Mr. Gould (see his 'Monograph of the Odontophorinæ,' pl. xvii.)*.

4. A Kea or Mountain-Parrot (*Nestor notabilis*), presented by the Acclimatization Society of Canterbury, N.Z., August 31st. This rare Parrot unfortunately only survived its arrival in this country a few days.

The total number of registered additions to the Society's Menagerie during the month of September 1872 was 94; of these, 1 was by birth, 50 by presentation, 40 by purchase, and 3 were received on deposit. The total number of departures during the same period, by death and removal, was 76.

The most noticeable of the additions were:—

1. A collection of Parrakeets from New Zealand, purchased Sept. 23rd. Besides *Cyanorhamphus novæ-zelandiæ* and *C. auriceps* (both of which we had previously received), this series embraced two examples of *Cyanorhamphus alpinus* †, which its describer now again holds to be a good species, and which is new to the collection.

2. A Snake of the genus *Coronella*, from Robben Island, near Cape Town, S. Africa, presented, September 24th, by Mr. G. H. B. Fisk. Dr. Günther considers that this belongs to a new species, and will describe it as *Coronella phocarum* ‡.

The Secretary also reported the birth of a third Hippopotamus (*Hippopotamus amphibius*), which had taken place that day in the Society's Gardens at 7 A.M.

The period of gestation in the present instance had been eight calendar months less four days, according to the keeper's observations.

The two former births had taken place on the 21st of February 1871 and the 7th of January 1872; but neither of these animals had lived many days.

In the present instance, the little animal having already begun to suck, and being more lively in its movements, a more favourable result was hoped for.

The following letter, dated Australian Museum, Sydney, June 14th, 1872, addressed to the Secretary, was read:—

"Dear Dr. Sclater,—I have had a series of photographs made of the different Wombats; and as it appears there is still some doubt about certain species, I now enclose copies of them.

"1. The *Phascolomys latifrons*, of a yellow colour, comes from the north-west bend of the Murray River. This species was first de-

* Both sexes are well figured in the 'Field' for Nov. 28, 1872, p. 500.

† *Platycercus alpinus*, Buller, Ibis, 1869, p. 39.

‡ See below, P. Z. S. for Nov. 19.

scribed from a skull by Professor Owen; and Gould's names are correct. The skull is very much rounder, contracted (but still broad) between the orbits, and the frontal bones are wedged in between the nasal; this is very characteristic of this species. The postorbital process is also much raised, and is never flat as in the allied species, the *P. lasiorhinus*.

2. "The *Phascolomys lasiorhinus*. Fur dark mouse-colour and silky; *nose hairy*; skull rather flat above, as regards the nasal bones, no wedge piece enters between them from the frontals; the mandibular condyle ends in a thin process at the base of the coronoid.

"3. *Phascolomys lasiorhinus*, var. *niger*. In this variety the skull is very much contracted between the orbits, and appears to be slightly more elongate. Our specimens come from Port Lincoln. I regret not to have a photograph of the skeleton of this species at hand; the scapula is broader than in *P. latifrons*, which has the narrowest scapula of all the Wombats known to me.

"4. *Phascolomys platyrhinus*. Grizzly grey-brown in colour; hair very harsh to the touch. This well-known species inhabits the south-east coast of New South Wales, and is probably also found in Victoria. I enclose photographs of it.

"5. *Phascolomys assimilis*, Krefft. Resembling in shape and colour the common Wombat, *P. platyrhinus*, but different in the skeleton. The skull is shorter and broader, the teeth are larger, the upper grinders more pushed out sideways, the lower ones more curved and turned inwards. There is a considerable difference in the incisor teeth: the upper ones are flat, compressed, striated, and with a groove in the middle; the lower ones are much curved.

"6. *Phascolomys wombat* from Tasmania, allied to *P. assimilis* and to certain fossil species.

"Yours sincerely,

"*Dr. P. L. Sclater, F.R.S.*" "GERARD KREFFT."

An extract was read from a letter addressed to the Secretary by Mr. Walter J. Scott, C.M.Z.S., dated Valley of Lagoons, Queensland, June 5th, 1872, concerning the question of the supposed native Tiger of Queensland, already referred to in former letters *.

Mr. Scott stated that Mr. Robert Johnstone, an officer of the Native Police, being in the scrub on the coast-range west of Cardwell with some of his troopers, had seen a large animal in a tree about forty feet from the ground, which on being approached sprang off to another tree about ten feet off, grasped it and descended tail first. The animal was said to have been larger than a pointer-dog, of a fawn-colour, with markings of deeper shade. Its head was quite round, and showed no visible ears; its tail was long and thick.

Mr. Scott was now more than ever convinced of the existence of the animal, and would not be content until he got specimens.

* See P. Z. S. 1872. p. 355.

Mr. Sclater read the following extract from a letter addressed to him by Professor J. Reinhardt, of Copenhagen, dated August 30th, 1872:—

"In turning over the 'Proceedings,' I have seen and read your valuable paper on the Quadrumana found north of Panama—and take the present opportunity to offer a suggestion with reference to the *Ateles vellerosus*, and particularly to the precise locality of this species.

"We have in our collection a full-grown female of a large *Ateles* brought from Mexico, and presented to the Museum in 1843 by the late botanist Prof. S. Liebmann. I have hitherto considered it a new species and given it a provisional name; but when I saw your beautiful figure of *Ateles vellerosus*, it immediately struck me that our Mexican Monkey might be that species. It is true our specimen is a much larger animal (total length 53″); the yellowish colour on the inside of the limbs does not extend so far down to the hands as in your specimens; and the whiskers offer only a faint trace of the whitish colour which encircles the face of your *Ateles*. But the difference in size seems not to be of much consequence, as long as it is uncertain whether your specimens are fully grown or not; and the difference in colour is, upon the whole, not more perplexing than that occurring in several other species of *Ateles*. I myself have little doubt of the identity; but, for the purpose of enabling you to judge for yourself, I enclose a drawing of my *Ateles*, made many years ago, shortly after it had been stuffed.

"In the notes communicated to me by my late friend Prof. Liebmann, it is stated that the said Monkey was shot in the neighbourhood of the small place Mirador, situated not far from the volcano of Orizaba in the State of Vera Cruz. This *Ateles* is common there, and lives in small troops in the deep barrancas up to an elevation of 2000 feet above the sea. Furthermore he met with it in the eastern parts of the State of Oaxaca; it was to be found in the forests there even up to 4000 feet, the same elevation to which the Tapir ascends. But at the same time he expressly states that he never met with this *Ateles*, nor indeed with any other Monkey, on the Pacific slope of the great Cordillera in Oaxaca, and that, as far as he could learn, Monkeys are to be found on the western coast only *south* of Tehuantepec. I therefore strongly suspect that Mr. Boucard had been misguided by untrustworthy information, when he told you (*anteà*, p. 5) that his specimen was procured near Acapulco. It may have been sent to him from that harbour; but it has certainly been killed at some distant place on the eastern slope of the Cordillera.

"Still one more remark, and I have done. If I am right in referring my *Ateles* to the *A. vellerosus*, and not to *A. melanochir*, the only evidence of the occurrence of this last-mentioned species in Mexico rests, so far as I can see, on the specimen sent by Deppe to the Museum at Berlin. But, from your note upon the northern limits of the Quadrumana in the New World (Nat. Hist. Rev. 1861, p. 507), it seems that this specimen, in some respects, does not quite agree

with the typical *A. melanochir* from Central America. I therefore should think it desirable to have it carefully compared with the *A. vellerosus* hitherto rather insufficiently known. Deppe procured his *Ateles* near the place from where Liebmann brought his Monkey; and from what I myself have been able to learn by personal experience in other part of tropical America, I am disposed to doubt the occurrence of two nearly allied but still distinct species of these large Monkeys in the very same locality. Should indeed, as I suspect, the *Ateles* sent home by Deppe really turn out to be an *A. vellerosus*, then the species would be the only Monkey known to range so far to the north as to the southern provinces of Mexico.

"Yours very truly,

"*P. L. Sclater, Esq.*" "J. REINHARDT."

In reference to the point last commented upon in Prof. Reinhardt's letter, Mr. Sclater stated that Prof. Peters had, at his request, kindly re-examined the specimen of *Ateles* in the Berlin Museum obtained by Deppe at Alvarado, and was now of opinion that it belonged to the species figured (P. Z. S. 1872, p. 2, Plate II.) as *Ateles vellerosus*, although it did not quite agree with Dr. Gray's description of that species in his Catalogue of Monkeys.

It would appear, therefore, that this species is the only certainly known *Ateles* which occurs in Mexico.

An extract was read from a letter addressed to the Secretary by Mr. R. Swinhoe, dated August 21st, in which he gave the following account of Deer belonging to a gentleman in Shanghai, which he believed to be *Cervus schomburgki*.

"I visited another gentleman who had a buck *Cervus sika*, and a buck brought by a ship from Singapore, which bothered me at first. It was in its reddish summer coat, and was spotted on the posterior half of its body. I learned that it had been presented to a European by the King of Siam. Its horns were just budding; but its master had the pair which were shed last year.

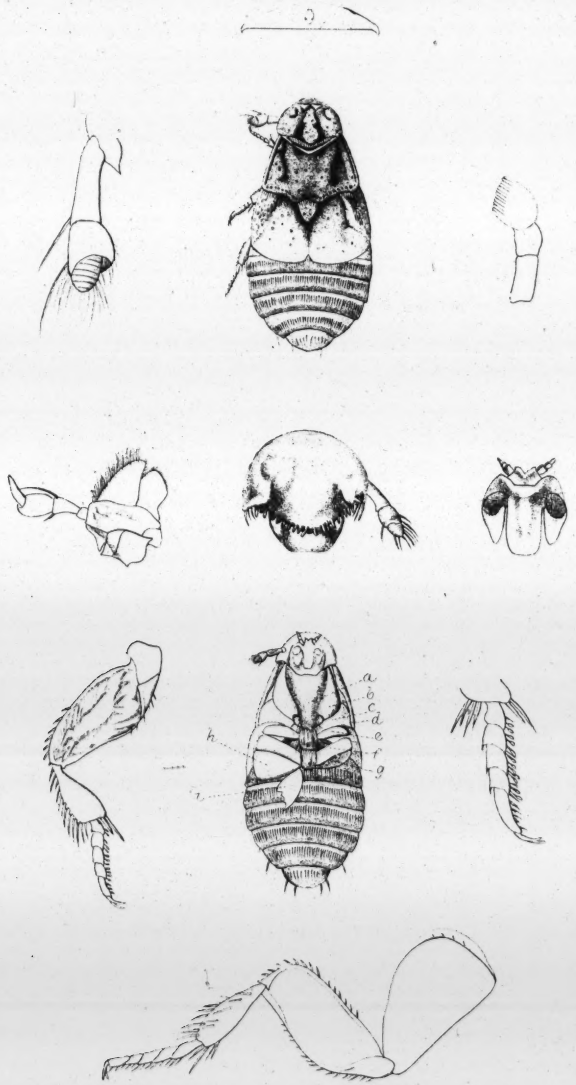
"The general appearance of the live animal gave one the idea of a *Panolia*; and I thought we had here the *P. platyceros* of J. E. Gray; but a view of the cast horns proved, from the straightness of the frontal snag, that the animal was rather *Rucervus* or Barasingha, and without doubt the *R. schomburgki*.

"A copy of your illustrated paper on Deer (for which I have to thank you much), lately come to hand, enables me to describe the animal more fully.

"*Cervus* (*Rucervus*) *schomburgki*, Blyth. Male in summer coat.

"In length of head, style of tail, and general form, like your *C. eldi* (in summer). Ears longer. Legs much longer and more slender. Upper parts of the same reddish-yellow colour (as in picture), but covered with numerous yellowish-white spots on the posterior half of the body, with a long yellowish-white horizontal line running along the lower part of the side above, and parallel to the border that

PRINCETON
230073
UNIVERSITY



G.H.Ford

Mintern Bros. imp.

Platypsilla castoris.

separates the darker colour of the upper parts from the paler belly. Tail similar. Its lower parts, however, are not pure white, but dingy yellowish, varied with white on the throat and on the breast.

"We have, then, in this animal a *Panolia* with the horns of a *Rucervus*; and I suspect you are right in suggesting (p. 349) that 'all three will be ultimately found to belong to the same subgeneric group.'

"I am trying to persuade my friend to send this rare and noble beast to the Society's Gardens."

The following papers were read :—

1. On *Platypsyllidæ*, a new Family of Coleoptera. By J. L. Le Conte, M.D.

[Received June 24, 1872]

(Plate LXVIII.)

Mentum large, transverse, flat, corneous, emarginate in front, with the angles broadly rounded; sides rounded, trilobed behind; middle lobe parallel on the sides, broadly rounded at tip: the lateral lobes are very large, flat, subtriangular processes, obliquely rounded on the outer margin, straight on the inner side, gradually narrowed behind, and rounded at the tips; these processes are nearly as long as the middle lobe, separated from it by narrow fissures, and, like it, project far over the gula. Ligula broad, corneous, filling up the emargination of the mentum, and projecting beyond it, emarginate in front, without paraglossæ. Labial palpi short, three-jointed: first joint thick, broader than long; second joint much thinner, about as long as wide; third narrower, and longer than the second. Lingua fleshy, concealed behind the ligula, emarginate in front.

Maxillæ large and strongly made; stipes broad, outer portion corneous; cardo large and corneous; lobes two, large, flat, and thin, ciliated with long bristles, outer one somewhat triangular, with curved sides; inner lobe smaller than the outer, broadly rounded at tip. Maxillary palpi four-jointed: first joint short; second triangular, a little longer than wide, outer angle with a strong bristle half as long as the third joint, inner angle with a much longer bristle extending nearly to the tip of the fourth joint; third joint triangular, larger than the second; fourth subfusiform, narrower, but scarcely shorter than the third.

Antennæ with the first joint elongate, subcylindrical, with a very long bristle at the outer distal angle, and a short one at the inner angle; second joint large, about half as long as the first, cup-shaped, fringed with long hairs; remaining joints forming an oval club, with distinct transverse articulations fringed with long hairs. (I cannot count accurately the number of joints in the club, but think I can detect only seven, which would make the total number of joints in the antenna nine. The base of the club is received so deeply in the cup-shaped second joint, that one joint may have escaped my notice.

Want of material for further dissection prevents more accurate investigation in regard to this subject, which, however, is of but small importance.) The antennæ are inserted under the edge of the side margin of the head, not far from the hind angles, and are not much longer than the head; when retracted they are received in deep marginal grooves on the *dorsal* surface of the prothorax.

Mandibles small, flat, subquadrate, with the outer side very much rounded, the inner side deeply crenulate, or rather pectinate, resembling those of *Corylophus*, as figured by Wollaston ('Ins. Maderensia'); stipes well developed, corneous, distinctly biarticulated.

Head nearly semicircular, with acute edge; cranium very slightly convex, without distinct frontal suture; occiput slightly prominent, fringed with stout depressed spines, forming a kind of comb, exterior to which, on each side, are long hairs fringing the hind angles; between the occiput and the front margin of the prothorax is a deep oblique sulcus, forming an obtuse angle at the middle. Labrum in the form of a broad segment of a circle, about four times as wide as long; when viewed from beneath, the hind margin is seen to be membranous on each side; there is a deep fovea at the middle; and the hind angles are somewhat prolonged. Eyes completely wanting. On the upper surface of the cranium, in front of the antennæ, there is seen on each side a large oval surface, the nature of which is unknown to me.

Prothorax trapezoidal, upper surface very slightly convex; apex acutely emarginate, side margin deeply grooved from the front angles nearly to the base, where the groove bends inwards, and becomes a sinuous line of large punctures parallel with the basal margin; the anterior part of this groove is used for the reception of the antennæ; the base of the prothorax is obliquely sinuate on each side, broadly and deeply emarginate in front of the scutellum; the hind angles are rounded, and fringed with long hairs. Prosternum very large, flat, subtriangular, concealing the insertion of the coxæ, produced behind into a large, broad process, rounded at tip, and fringed with long hairs; this process extends over the front part of the mesosternum; side pieces separated apparently from the pronotum by suture; coxal cavities open behind.

Mesothorax short; scutellum large and triangular; mesosternum obtusely elevated in front, where it is covered by the prosternum, produced behind into a similar broad obtusely rounded process, fringed with long hairs, and projecting in like manner over the front part of the metasternum; side pieces large, transverse, finely aciculate, not distinctly divided.

Metathorax short; metasternum covered in front by the process of the mesosternum, produced behind into a similar process, fringed with long hair, and projecting over the femoral articulation; side pieces large, transverse, oblique.

Elytra not longer than the prothorax, truncate, and broadly rounded at tip, slightly imbricate at the suture, entirely without veins, except the usual subsutural one; epipleuræ not separated by a line, but with a series of large punctures along the lateral margin;

a faint triangular longitudinal impression is also seen inside of the humeri; five dorsal segments of the abdomen, and the angles of the one anterior to them, are exposed. Lower wings wanting.

Abdomen: dorsal surface flat, not margined at the sides, each exposed segment with a transverse row of small depressed bristles; spiracles situated near the hind angles of each segment, equidistant from the lateral and posterior margins; ventral segments slightly convex, six are visible behind the posterior coxæ, which conceal two segments and the base of the third. The ventral sutures are straight, with the exception of the last two, which are curved; the last segment is feebly bisinuate at tip.

Coxæ flat, not at all prominent; front ones small, subtriangular, with rounded angles; middle coxæ similar in form, but larger; hind coxæ very large, extending to the side margins of the body; outer surface flat; inner (or upper) surface with two obtuse prominences, one near the front margin, the other about the middle, serving for its firmer attachment.

Legs short; trochanters small, continuous with the outline of the thighs and on their inner face; thighs stout and compressed; tibiæ compressed, triangular, rounded at tip, armed externally with long spines; terminal spurs long, slender; front tibiæ shorter and broader than the others, being only one third longer than wide; hind tibiæ more than two and a half times as long as wide, with two small additional spines on the inner face, above the terminal spurs; tarsi five-jointed, a little longer than their respective tibiæ, slender, somewhat compressed, spinous beneath, front and middle pairs with joints 1–4 equal, in the ♂ with one row of claviform membranous appendages on each side, in addition to the spines; hind tarsi with the first joint longer than the second; articulations somewhat oblique beneath, spinous, but without membranous papillæ; last joint of all the tarsi one half longer than the fourth joint; claws moderate in size, simple.

Body ovate elongate, depressed, resembling at first sight a minute *Blatta*, a resemblance increased by the pale brown colour and somewhat translucent sides.

The only representative of this family known is a small brown insect 4 millims. long (*Platypsylla castoris*, Ritsema), found on the American Beaver. Two specimens, collected from the Beavers in the Zoological Gardens of Amsterdam, were most kindly sent to me by Mr. Ritsema, who, on learning that my opinion of the relations of the insect were quite different from those expressed by him, has, in the most courteous manner, authorized and, indeed, requested me to publish the results of my investigations as speedily as possible.

Specimens were sent by the late Mr. Denny to Prof. Westwood, who published a description of them about the same time, but a little later than the notice by Mr. Ritsema, under the name *Platypsyllus castorinus*. I owe to the courtesy of Professor Westwood an opportunity of making a hasty and somewhat superficial examination of his specimens during a visit in May 1871, when I stated my belief that this insect would have to be regarded as Coleopterous.

Mr. Ritsema regarded it as representing a family of the so-called suborder *Suctoria*, or *Aphaniptera*, equivalent in value to the *Pulicidæ*, or true fleas. Professor Westwood, on the other hand, viewed its organization as so peculiar that he established upon it a new order of insects, which he named *Achreioptera*.

After the detailed description given above of the separate organs, it seems hardly necessary for me to defend my opinion of the Coleopterous nature of this object, as against the views expressed by my learned colleagues. It will be better, by an analysis of the characters detailed, and a comparison of the different parts with familiar forms, to show that the peculiarity of *Platypsylla* consists rather in the assemblage of unusual and rare characters with a further modification and exaggeration of certain parts, indicating only family value or strange habits of life, than any thing of sufficient importance to warrant its reception as a distinct order. No differential characters for his new order were given by Professor Westwood; and without very decided modifications in the plan of the mouth, thorax, and wings, profoundly different from those seen in other orders, it would be very inexpedient to rate any species, however odd its appearance, as an equal to the great and important types in nature which are recognized as orders of insects.

The structure of the mouth, the size and mobility of the prothorax, the presence of elytra, the arrangement of the sternal surface, and the insertion of the legs, all forbid, in the most positive manner, its reference to the Aphaniptera, or any allied series of insects.

In comparison with other families of Coleoptera the mentum is altogether peculiar in form; but an approach to it is found in *Leptinus*, a singular genus also subparasitic in its habits. It has been usually classed with *Silphidæ*; but in examining a species found in North America, I thought the form of the mentum, with other peculiarities, sufficient to warrant its reception as a distinct family, *Leptinidæ* (Le Conte, Proc. Acad. Nat. Sc. Philadelphia, 1866, p. 368). The mentum, in fact, is large, subquadrate, and the hind angles are produced over the gula in long spiniform processes, the feebly developed analogues of the triangular wing-like processes of *Platypsylla*.

The ligula and labial palpi present nothing worthy of note; the maxillæ also are of not unusual form in various parts of the Clavicorn series; the strong corneous stipes and cardo resemble more nearly those of *Trichopterygidæ* than any other family.

The form of the mandibles is entirely that of *Corylophidæ*.

The labrum is peculiar from its great breadth as compared with its length. I do not remember to have seen any figure resembling it.

The head is peculiar in form, from the deep groove behind the occiput, between it and the front margin of the prothorax, and still more wonderful on account of the posterior comb of short, flat spines,—a beautiful adaptation to the habits of the animal, enabling it to glide always forwards amidst the dense fur in which it lives—a movement which is also facilitated by the fringes of hair on the hind angles of the head and prothorax, the edges of the sternal plates, and the long spines of the tibiæ.

The antennæ are only slightly modified from the irregular form seen in the *Gyrinidæ* and certain genera (*Parnus*, *Helichus*, &c.) of *Parnidæ*; the reception of the antennæ in cavities on the *dorsal* surface of the prothorax is a rare character, but occurs in *Physemus*, Lec., of the *Byrrhidæ*, *Mychocerus*, Er., of doubtful position, and again in a totally different genus, *Usechus*, Motsch., of the *Tenebrionidæ*. In all the genera mentioned the club of the antennæ is globose, and the cavities are round fossæ, near the front angles of the pronotum; their extension into grooves, longer than the antennæ themselves, as in *Platypsylla*, is the first instance known, and certainly one of the most remarkable characters of the genus.

The prothorax is not unusual in form, being somewhat like that of *Silpha*, with the addition only of the singular antennal grooves just mentioned; the transverse rows of punctures near the basal margin recall those seen in *Dytiscidæ* and *Gyrinidæ*.

The immense development of pro- and mesosternum is very similar to that of *Limulodes*, a very abnormal North-American genus of *Trychopterygidæ*; but, in addition, the metasternum is similarly and equally developed, a character peculiar to this family.

The coxæ are somewhat peculiar, feebly resembling those of *Gyrinidæ*; but the side pieces of meso- and metathorax are quite different from those of that type, and are strongly Trichopterygidan in their form. The hind coxæ of *Gyrinidæ*, moreover, are contiguous for a long distance on the inner margin (as is also the case in *Dytiscidæ* and *Amphizoidæ*); and the coxal articulation is quite different.

The elytra are similar to those of *Omalium* and many other *Staphylinidæ*, but are peculiar from the absence of distinct epipleuræ, a rare character in the first primary division of Coleoptera; the suture is slightly imbricated, though less so than in *Xantholinus* and allied genera of *Staphylinidæ*.

The abdomen presents nothing particularly worthy of mention, being similar to that of many *Staphylinidæ*; the concealment of the first ventral segments by the hind coxæ is remarkable. An approach to this arrangement may perhaps be observed in the so-called ventral plates of *Cyllidium* of the *Hydrophilidæ*.

The only peculiarity worthy of notice in the legs is that the front and middle tarsi of the ♂ are furnished with two rows of papillæ, or clavate, flat, membranous appendages, similar to those seen in various groups of the adephagous series. Otherwise the legs are not very dissimilar to those of some genera of *Anisotomini* (*Cyrtusa*, *Colenis*, &c.), a tribe of *Silphidæ*.

It will be seen by the above analysis of characters that the affinities of this insect are very composite, but all in the direction of the Adephagous and Clavicorn series, though chiefly with the latter. The most convenient position of the family will probably be between *Hydrophilidæ* and *Leptinidæ* as the families are now arranged, though its tendency to *Trichopterygidæ* and *Corylophidæ* is equally strongly manifested.

It is therefore a very peculiar and extraordinary synthetic type, which is almost equally in and out of place in any linear arrangement of the series with which it is allied.

I must here return my sincere thanks to Messrs. J. Weyers and Roelofs, of Brussels, for their kind aid in obtaining and forwarding the specimens from Mr. Ritsema, and also to the Rev. A. Matthews for his friendly offer to dissect one of the specimens for my investigation—a task which he has accomplished with the same skill with which he made his wonderful dissections of *Trichopterygidæ*.

It is very probable that a family showing such varied relationships either was in former times, or is at present, widely diffused; and it is quite possible that, when looked for, similar Epizoa may be found upon other aquatic mammals. The European Beaver, the Capybara (*Hydrochœrus*), and the Musk-rat (*Fiber zibethicus*) should particularly be examined for allied species.

The generic characters are contained in the exposition of structure given above, and, until other species are discovered, need not be separated from those belonging to the family.

PLATYPSYLLA CASTORIS, Ritsema.

Elongato-ovata, depressa, luteo-fulva, nitida, capite angulis posticis pilis longis fimbriato, occipite spinis brevibus depressis transversim uniseriatim pectinato; prothorace trapezoideo, antrorsum angustato, latitudine vix breviore, dorso parce punctato, lateribus obliquis pro receptione antennarum sulcatis, basi trisinuato, linea punctorum sinuata ante basin notato; coleopteris transversis, vage parce punctulatis, versus latera pubescentibus, impressione brevi basali intra humeros notatis; abdomine segmentis dorsalibus serie transversa breviter setosis.

Long. 4 millim.

Platypsilla castoris, Ritsema, Petites nouvelles Entomologiques, 1869 (Sept. 15); Tijdschr. voor Entomologie, 2nd series, v. p. 185.

Platypsyllus castorinus, Westwood, Entomologist's Monthly Magazine, vi. p. 118 (Oct. 1869).

Collected by Mr. Ritsema on the American Beavers (*Castor canadensis*) in the Zoological Society's Gardens at Amsterdam.

DESCRIPTION OF PLATE LXVIII.

Fig. 1. Upper surface of *Platypsylla castoris*.

2. Under surface: *a*, prosternum; *b*, episternum, and *c*, epimeron of prothorax; *d*, mesosternum; *e*, cavity of middle coxa and side pieces of mesothorax; *f*, metasternum; *g*, cavity of hind coxa; *h*, hind coxa; *i*, base of hind femur.

The small front coxæ are nearly concealed by the broad process of the prosternum.

3. Head, with antenna, dorsal view.
4. Labrum, viewed from beneath.
5. Antenna.
6. Mandible, more highly magnified.
7. Maxilla.
8. Mentum, with ligula and labial palpi.
9. Anterior leg.
10. Anterior tarsus, more highly magnified, showing the series of membranous papillæ.
11. Hind leg, with coxa.

2. Synonymy of and Remarks upon Australian and Western Polynesian Land-Shells. By J. Brazier, C.M.Z.S., M.R.S.N.S.W.

[Received June 21, 1872.]

1. Helix (Geotrochus) hermione.

1869. *Helix* (*Geotrochus*) *hermione*, Angas, Proc. Zool. Soc. p. 625, pl. 48. fig. 5.
1870. *Helix biocheana*, Crosse, Journ. de Conchyl. p. 249.
Hab. Bougainville Island, Solomon group.
A very pretty species, distinguishable from the black variety of *H. meta*, Pfr., by its invariably smaller size, by the presence of the straw-coloured band below the keel instead of next the suture, and by the last whorl being more distinctly keeled and less convex.

2. Helix (Geotrochus) adonis.

1869. *Helix* (*Geotrochus*) *adonis*, Angas, Proc. Zool. Soc. p. 624, pl. 48. fig. 4.
1870. *Helix metula*, Crosse, Journ. de Conchyl. p. 248.
Hab. Bougainville Island, Solomon group.
A delicately orange-coloured species, intermediate in form between *H. meta*, Pfr., and *H. gaertneriana*, Pfr.

3. Helix (Rhytida) villandrei.

1865. *Helix villandrei*, Gassies, Journ. de Conchyl. p. 210.
1869. *Helix* (*Rhytida*) *boydi*, Angas, Proc. Zool. Soc. p. 626, pl. 48. fig. 8.
Hab. Recherche Bay, San Christoval, Solomon Group (*coll. Brazier*).
Of this species I obtained two inferior specimens at the above locality when at the Solomons in 1865; since then they have been brought to Sydney by the island traders in countless numbers. When first described by Gassies this species was put down as being from New Caledonia; it was, however, carried there by the French missionaries, and thence taken to France.

4. Helix (Videna) bellengenensis.

1871. *Helix bellengerensis*, Cox, Proc. Zool. Soc. p. 54.
1871. *Helix bellengenensis*, Brazier, Proc. Zool. Soc. p. 321.
Hab. Manarm Creek, Bellengen River, New South Wales (*coll. Brazier*).
This is a simple lenticular species, allied to *H. leucocheilus*, Cox, from which it differs in being more conical and more sharply keeled. It belongs to the subgenus *Videna* of H. and A. Adams.

5. Helix (Merope) novæ hollandiæ.

1834. *Carocolla novæ hollandiæ*, Gray, Proc. Zool. Soc. p. 67.
1852. *Helix dupuyana*, Pfr. Proc. Zool. Soc. p. 159.

1868. *Helix* (*Geotrochus*) *dupuyana*, Cox in Monograph of Australian Land-Shells, p. 66, pl. 2. fig. 5.

1852. *Helix dupuyana*, Reeve in Conch. Icon. sp. 354.

Hab. Ash Island, Hunter River, Wingham, Manning River, Scone, New England, Port Macquarie, Macleay, Nambuccra, and Bellengen rivers, New South Wales (*coll. Brazier*).

Specimens from the Bellengen are very large, a few that I collected measuring 17 lines in the greater diameter, and 13 lines in the lesser. A variety is also met with of a dark dirty yellow colour, with a dark chestnut band on the periphery. The specimens from the other localities are of smaller size and of a dark chestnut colour. At Port Macquarie it is found on high hills near the sea, under logs.

6. Helix (Callicochlias) coxi.

1864. *Helix forbesii*, Cox, Proc. Zool. Soc. p. 40 (non Pfr.).

1864. *H. cerea*, Cox, Cat. Austr. Land-sh. p. 36 (non Gould).

1866. *H. coxi*, Crosse, Journ. de Conch. p. 195.

1868. *H. cerata*, Cox, Monograph of Australian Land-Shells, p. 58, pl. 8. fig. 4.

Hab. Port Molle and Port Denison, Queensland (*coll. Brazier*).

The ground-colour of this species is white; the epidermis is remarkably thin; and the shell has a waxy and rather glossy appearance, especially underneath. Found in great numbers on the trunks of the native fig-trees.

7. Helix (Conulus) umbraculorum.

1864. *Helix umbraculorum*, Cox, Cat. Austr. Land-sh. species 136.

1864. *Helix wilcoxi*, Cox, Proc. Zool. Soc. p. 594.

1868. *H. wilcoxi*, Cox, Monograph of Australian Land-Shells, p. 9, pl. 4. fig. 12.

Hab. Clarence and Richmond rivers (*Macgillivray*); Macleay River, also Lassey's Island, Bellengen River, New South Wales (*Brazier*).

The first name given to this species Dr. Cox singularly ignores; and in his Illustrated Monograph there is no mention of its being a synonym. In the Proc. Zool. Soc. 1867, p. 723, we have the *H. umbraculorum* mentioned by him as being allied to *H. turriculata*, Cox.

8. Helix (Charopa) midsoni.

1871. *Helix* (*Discus*) *atkinsoni*, Cox in Legrand's Collections for Monograph of Tasmanian Land-Shells, species 62, pl. 2. fig. 12.

Hab. Brown's River, Tasmania (*coll. Cox*).

The change in the specific name is necessary, as Theobald described an East-Indian species in Journ. As. Soc. Bengal, 1859, under the name of *H. atkinsoni*. I have named it after Mr. Midson, an enthusiastic collector in Tasmania.

9. HELIX (CHAROPA) MILLIGANI.

1871. *Helix* (*Videna*) *milligani*, Brazier, Proc. Zool. Soc. p. 698.
1871. *H.* (*V.*) *milligani*, Brazier, in Legrand's Collections for Monograph of Tasmanian Land-Shells, species 69, published in August, edition 2.
1871. *Helix* (*Charopa*) *scrupulus*, Cox in Legrand's Collections for Monograph of Tasmanian Land-Shells, species 76, published in September, edition 2.
Hab. Foot of Mount Wellington, Tasmania (*coll. Brazier*).

10. HELIX (RHYSSOTA) SUBRUGATA.

1851. *Helix subrugata*, Pfr. Proc. Zool. Soc. p. 259.
1852. *H. subrugata*, Reeve, Conch. Icon. sp. 773.
1860. *Nanina subrugata* (*Thalassia*), Albers, Heliceen, ii. p. 59.
1864. *Helix graftonensis*, Cox, Cat. Austr. Land-sh. sp. 137.
1864. *H. clarencensis*, Cox, Proc. Zool. Soc. p. 594.
Hab. South Grafton, Clarence River, New South Wales (*Brazier*).
This species was never found in New Zealand, as has been stated by Mr. Reeve in his 'Conch. Icon.,' upon the authority of the Cumingian collection. I obtained some hundreds of it in a few minutes, crawling on the ground and on small bushes after heavy rains, when at Grafton. It was also obtained by Mr. J. Macgillivray at the same place.

11. TORNATELLINA JACKSONENSIS.

1864. *Bulimus jacksonensis*, Cox, Cat. Austr. Land-sh. p. 25.
1868. *Achatinella* (*Frickella*) *jacksonensis*, Cox, Monograph of Australian Land-Shells, p. 77, pl. 12. fig. 15.
Hab. Darling Point, Shark's Bay; Botanic Gardens, Sydney, New South Wales (*Brazier*).
The other species described by Cox as *Achatinella wakefieldiæ*, from the Clarence and Richmond rivers, is also a *Tornatellina*.

12. BULIMUS (CHONDRULA) ADELAIDÆ.

1863. *Bulimus* (*Chondrula*) *adelaidæ*, A. Adams and Angas, Proc. Zool. Soc. p. 522.
1864. *Pupa ramsayi*, Cox, Cat. Austr. Land-sh. p. 28.
1868. *Bulimus* (*Napæus*) *adelaidæ*, Cox in Monograph of Australian Land-Shells, p. 69, pl. 13. fig. 5.
Hab. Flinders range, Rapid Bay, and Wallaroo, South Australia (*Masters*); Wombo, near Singleton, New South Wales (*Brazier*).
This species is very rare in New South Wales. I have one fine specimen, found at Wombo; but it is rather more elongated than the type from South Australia.

13. BULIMUS (LIPARUS) BRAZIERI.

1871. *Bulimus* (*Liparus*) *brazieri*, Angas, Proc. Zool. Soc. p. 19, pl. 1. fig. 28.
Hab. Stirling range, King George's Sound, under dead "grass-tree" (*Xanthorrhœa*).

This pretty longitudinally rugosely plicately ribbed species belongs to the same group as *B. angasiana*, Pfr., *B. baconi*, Benson, and *B. mastersi*, Cox, all from the S.W. region of the Australian continent. When I sent Mr. Angas the first specimens, I marked them Sinclair's range, in error, instead of Stirling range.

3. Notes on the Habits of the Churinche (*Pyrocephalus rubineus*). By W. H. Hudson, C.M.Z.S.

[Received August 6, 1872.]

The Churinche (*Pyrocephalus rubineus*) is a common species in the neighbourhood of Buenos Ayres. Its brilliant plumage and remarkable song make it one of the best-known of our summer visitors. But the naturalist will find in the peculiarity of its migratory habits a far more interesting subject of contemplation. It is commonly called "*Churinche*," from its note; also "*Federál*," from its predominating hue being the favourite colour of the political party (now happily extinct) of that name. The Churinche appears about the end of September, and is usually first seen in localities to which the Tyrantbirds and Tæniopteras are also partial, such as low grassy grounds, with here and there a stalk or bush, and near a wood or plantation. Insects are most abundant in such places; and here the Churinche is seen, perched on a twig, darting at intervals to snap at the flies after the fashion of the Flycatchers, and frequently uttering his low, plaintive, and mellow note. This bird is very common in the woods along the Plata; every orchard on the pampas is visited by a few of them; and they are very abundant about Buenos Ayres city. Going south they become rarer; but, strange to say, a few individuals find their way to the shores of the Rio Negro, though before reaching it they must cross a high, barren country quite unsuited to them. The natives of the Carmen have no name for the Churinche, but speak of it as a bird wonderful for its beauty and seldom seen. Amongst the dull-plumaged Patagonian species it certainly has a very brilliant appearance.

A very few days after their arrival the Churinches pair; and the male selects a spot for the nest—a fork in a tree from six to twelve feet from the ground, or sometimes a horizontal bough. This spot the male visits about once a minute, sits on it with his splendid crest elevated, tail spread out, and wings incessantly fluttering, while he pours out a continuous stream of silvery gurgling notes, so low they can scarcely be heard ten paces off, and somewhat resembling the sound of water running from a narrow-necked flask, but infinitely more rapid and musical. Of the little bird's homely, grey, silent mate the observer will scarcely obtain a glimpse, she appearing as yet to take little or no interest in the affairs that so much occupy the attention of her consort, and keep him in a state of such violent excitement. He is exceedingly pugnacious; so that

when not fluttering on the site of his future nest, or snapping up some insect on the wing, he is eagerly pursuing other male Churinches, apparently bachelors, from tree to tree. At intervals he repeats his remarkable little song, composed of a succession of sweetly modulated metallic trills uttered on the wing. The bird usually mounts upwards from thirty to forty yards, and, with wings very much raised and rapidly vibrating, rises and drops almost perpendicularly half a yard's space five or six times, appearing to keep time to his notes in these motions. This song he frequently utters in the night, but without leaving his perch; and it then has a most pleasing effect, as it is less hurried, and the notes seem softer and more prolonged than when uttered by day. About a week after the birds have come, when the trees are only beginning to display their tender leaves, the nest is commenced. Strange to say, the female is the sole builder; for she now lays by her indifferent mien, and the art and industry she displays more than compensate for the absence of those beauties and accomplishments that make her mate so pleasing to the sight and ear. The materials of which the nest is composed are almost all gathered on trees; they are lichens, webs, and thistle-down: and the dexterity and rapidity with which they are gathered, the skill with which she disposes them, the tireless industry of the little bird, who visits her nest a hundred times an hour with invisible webs in her bill, are truly interesting to the observer. The lichens firmly held together with webs, and smoothly disposed with the tops outside, give to the nest the colour of the bark it is built on.

After the Churinche's nest is completed, the *Ventiveo* (*Pitangus bellicosus*) and the common Blackbird (*Molothrus bonariensis*) are the troublers of their peace. The first of these sometimes carries off the nest bodily to use it as material in building its own; the female Blackbird is ever on the look out for a receptacle for her eggs. Seldom, however, does she succeed in gaining admittance to the Churinche's nest, as he is extremely vigilant and violent in repelling intruders. But his vigilance at times avails not; the subtle bird has watched and waited till, seizing a moment when the little scarlet tyrant is off his guard, she drops her surreptitious egg into his nest. When this happens the Churinches immediately leave their nest. The nest is sometimes lined with feathers, but usually with thistle-down; the eggs are four, pointed, and spotted at the great end with black; usually each egg has also a few large grey spots. The young are at first grey, marked with pale rufous, but soon become entirely grey, like the females. In about a month's time the belly of the males begins to assume a pale mauve-red; this spreads upwards towards the breast and throat; and finally the crest also takes on this colour. The Churinches raise two broods in a season—but if the nest is destroyed, will lay as many as four times.

The Churinche is the first of our summer visitors to leave us. As early as the end of January, and so soon as the young of the second brood are able to feed themselves, the adults disappear. Their going is not gradual, but they all vanish at once. The departure of

all the other migratory species that visit us in summer takes place after a very sensible change in the temperature; but at the end of January the heat is unmitigated—it is, in fact, often greater than in the solstice. Thus the Churinche disappears nearly three weeks before the Swallows (the first birds, excepting him, to leave us); and yet he reappears simultaneously with them.

When the adults have gone, the silent young birds remain. In a month's time the sexes of these may be distinguished. After another month the males are heard at times to sing, and are frequently seen pursuing each other over the fields. It is only at the end of April, three months after the old birds have gone, that they also take their departure. How remarkable it is that so long a time should elapse between the departure of the old and of the young birds, when so many other species migrate at the same time with their offspring! The adult Churinche leaves us three weeks before the adult *Progne chalybea*, the young Churinche nine weeks after the young *P. chalybea*. The autumn cold, storms, and frosty nights seem to be the immediate cause of the young birds' departure; but in the departure of the adults migration appears to be an instinct quite independent of atmospheric changes.

4. Descriptions of some new Starfishes from New Zealand. By Captain F. W. Hutton, C.M.Z.S.

[Received August 7, 1872.]

Fam. Ophiuridæ.

Ophiothrix cærulea, sp. nov.

Disk pentagonal, the sides with reentering obtuse angles; radial shields naked, shagreened, the outer corner curved upwards, each pair separated by three rectangular plates, bearing one or two long tapering rough spines; centre of disk and a band between the pairs of radial shields covered with small scales, each bearing a single spine.

Rays about four times the diameter of the disk; under ray-plates cordate, with the point inwards and truncate; upper ray-plates rather broader than long, the sides produced into angles and bent down; spines arranged three in a row, longer than the breadth of the ray, tapering and strongly spinous.

Mouth-shields rhomboidal; tooth-papillæ three in a row, except the lowest, which has only two.

Colour pale blue, with a band of purplish white, edged with purplish black down the centre of the upper surface of the rays; under surface of the rays white; disk mottled with purplish; mouth-papillæ yellowish.

About 3 inches from the tips of the rays.

Two specimens are in the Colonial Museum, but without locality.

OPHIONEREIS FASCIATA, sp. nov.

Disk round; radial shields small, half covered, parallel, distant; scales small, larger near the margin.

Rays five to six times the diameter of the disk; under ray-plates squarish, outer edge straight; upper ray-plates rectangular, broader than long, outer edge concave; spines in three or four rows, rounded, slightly tapering, about equal in length, rather longer than the breadth of the ray; tentacle-scale large, rounded, oval.

Mouth-shields broadly ovate; mouth-papillæ small, round, and blunt, four on each side.

Colour yellowish white, the rays banded above and below with purplish black, and the disk irregularly marked with the same colour; mouth-shields black; mouth-papillæ white.

About 5 inches from the tips of the rays.

Cook's Straits, on rocks below high-water mark (*F. W. H.*), and the Chatham Islands (*H. H. Travers*).

OPHIACTIS NIGRESCENS, sp. nov.

Disk rounded; radial shields narrow, oblong, widely diverging, shagreened; remainder of disk covered with small scales bearing short round spines, giving them a granulated appearance.

Rays about six times the diameter of the disk; under plates broader than long, with the inner and outer margins convex, and the lateral margins concave; upper plates wedge-shaped, the point inwards and truncate, outer margin convex; spines four in a row, cylindrical, with blunt points shagreened, the upper one much larger than the others, and longer than the breadth of the ray.

Mouth-shields oblongo-pentagonal, the point outwards, and narrowed inwards.

Colour brownish black.

About 6 inches from ray to ray.

Several specimens are in the Colonial Museum; but the locality is not stated.

OPHIURA CYLINDRICA, sp. nov.

Disk subpentagonal, granulated.

Rays from three to four times the diameter of the disk, scarcely tapering, and rather flattened above; lower ray-plates longer than broad, outer edge convex; upper ray-plates convex on the outer edge and tapering inwards, nearly as long as broad; side plates with six equal, rather pointed, short spines, which do not cover half of the next plate.

Mouth-shields irregular, cordate or lenticular, sometimes obsolete; side mouth-shields the same; mouth-papillæ 6–8, the two outer ones broader.

Colour pale yellowish brown; rays with dark brown transverse bands, edged with black, on the upper surface; disk spotted and mottled with the same.

About 3 inches from the tips of the rays.

Two specimens are in the Colonial Museum, locality not stated.

Fam. Asteriadæ.

ASTERIAS MOLLIS, sp. nov.

Rays five, broad, rounded, tapering, their length between three and four times the width of the disk; spines single, acute, in longitudinal rows on the rays, but irregularly placed on the disk; about nine rows of spines on a ray, the two lowest on each side placed close to the ambulacra, the outer of the two composed of longer spines; ambulacral spines shorter, in two rows.

Diameter about four inches.

Two specimens in the Colonial Museum, with dredgings, but locality not stated.

ASTERIAS SCABER, sp. nov.

Rays seven, rounded, tapering, their length from three to four times the width of the disk; upper surface covered with granular tubercles, which have occasionally a spine in the centre; six rows of spines on each ray, the two lowest on each side placed close to the ambulacra, the upper on the side of the ray; occasionally an interrupted row of spines along the top of the rays; ambulacral spines slender, in two rows.

Diameter about 6 inches.

Two specimens are in the Colonial Museum, among dredgings, with the last, but no locality stated.

Fam. Pentacerotidæ.

PENTACEROS RUGOSUS, sp. nov.

Rays as long as the disk; centre of disk and a line along each ray raised (dry); upper surface covered with flat granular plates, arranged in a row down the centre of each ray, but irregularly on the other portions; marginal shields $\frac{2}{2}\frac{5}{5}$ from ray to ray, covered with minute blunt rough spines.

About 4 inches in diameter.

Allied to *P. granulosus*; but the rays are more pointed, the dorsal plates are flat-topped, and all the granules are of equal size.

Two specimens in the Colonial Museum, locality not stated.

Fam. Asterinidæ.

PTERASTER INFLATUS, sp. nov.

Pentagonal, with five radiating ribs, which are ovate and swollen on the inner half, and slightly convex on the outer half; centre of disk hollowed; margin thin, sharp; back tessellated with smooth flat tubercles, getting smaller towards the margin, where they are granulated; on the rays they are large and irregularly placed, but showing a tendency to arrange themselves along the rays; lower surface with short simple blunt spines, pointing inwards; webbed ambulacral spines short, not much longer than the ambulacral spines.

Colour reddish (dry). Diameter $5\frac{1}{2}$ inches.

A single specimen is in the Colonial Museum, locality not stated.

5. Notes on Chinese Mammalia observed near Ningpo. By R. Swinhoe, F.Z.S., H.B.M. Consul at Ningpo.

[Received September 24, 1872.]

We appear to have two species of *Cervulus* in our district:—one ranging to the south, and seemingly the *C. reevesi*, J. E. Gray; and the other to the north, and abounding about the hills to the back of Hangchow city. The former is much more rarely brought to this market than the latter, and would appear to be very scarce within our range: only two were brought in last winter, and both of these females; while of the latter numbers arrived, and of both sexes. The Chinese do not distinguish them.

The first example of *Cervulus* obtained had all the characters of a *C. reevesi* of South China and Formosa about four months old, and was the first Deer I procured here. I naturally supposed that it was of the ordinary species, which the people here call the "venison" of their hills. But what was my delight to have soon afterwards two bucks brought in, with yellow heads, showing a species quite new to me. It then remained a question whether the former was not the female of the latter; but I soon found this could not be, as the new species was more porcine in form, had shorter body and legs, and a shorter and higher head: but for a long time I could neither get the male of *C. reevesi* nor the female of the new species. At last females of the latter flowed in, and one spotted fawn. This last was a clencher. Years ago I procured a specimen of the young of *C. reevesi*, which is now in the British Museum, and it bore no signs of spots. The flat skin of the young of *C. vaginalis* that I got in Hainan, now also in the British Museum, had only a line of small yellowish spots on either side of the dorsal ridge (see P. Z. S. 1869, p. 653, where it is by mistake described as the skin of the fawn of *Panolia eldi*). The spotted young of the present species I hailed with particular delight, as I could not but believe that I had got hold of a veritable *Cervus*; but on close examination I found it to be no other than the fawn of a *Cervulus*. I have jotted the following description of its appearance:—

Fawn about six weeks old.—Hair softer, longer, and more woolly than in adult, especially about the cheeks, neck, and breast; coloured like the female, with but very little black mottling about the back and no black on the legs. Its sides have three sets of yellowish spots:—one on each side of the back running in continuous series from the middle of the hind neck to the tail, distant $1\frac{1}{2}$ inch across the back; another from the shoulder, the spots at first coalescing, and on the haunch scattering; another set below this again, more interrupted and scattered. The spots are of the size of a good-sized pea; but their arrangement on the two sides of the animal do not entirely agree.

I would ask leave to dedicate this species to the Secretary of this Society, who has long devoted himself to the special study of this group.

CERVULUS SCLATERI, sp. nov.

Measurements of a Horned Buck.

Muzzle to root of tail 2 ft. 10 in.; tail 6½ in.

Height at shoulders 19 in., at rump 20 in.

Girth of neck 14 in., of body behind shoulders 21½ in., of ditto before thighs 17½ in.

Length of head 8 in.; nostril to rise of pedicle 2·6 in.; of pedicle 5·8 in., of horn beyond 2·5 in.

Muzzle to fore angle of the eye 4 in.; eye 1 in. across, with a deep sunken fosse of about same length in front.

Ear: length 3·5 in.; greatest breadth 2 in.; between ears 2 in.

Height of head taken behind eye 4·5 in.

Girth of muzzle 7¼ in., behind eye 13¾ in.

From elbow to tip of fore foot 11½ in., from knee to tip of hind foot 9 in.

Hoof-toes ·9 in. each, curved towards each other, with the under surface flat or somewhat bulging.

Horn-pedicle rounded on upper surface above forehead, and lying back parallel to ear, which extends rather beyond tip of horn. The horn is round and broad at base, narrowing to tip and slightly curved inwards, with a ring of tubercles round the edge of the base and a large tubercle-like tine given off inwards. In a more mature animal this is larger, but it does not seem to form into a distinct tine as in *C. reevesi*.

Hind neck, back, and rump yellowish chestnut, finely mottled with black. From nostrils above to angle of horn-pedicles brown; along upper surface of pedicle a deep black line; in front and round eye light yellowish chestnut, freckled with black; chin white; rest of head, including ears, chestnut-buff, the latter fringed internally and thinly dotted with white. Under neck and breast, and down the inside of fore leg, light chestnut-buff. Sides of body and belly washed with black, which deepens on the fore legs and becomes rich black on the soles between the toes; under tarse deep reddish brown. Abdomen light chestnut, nearly naked in front and between the thighs; inside of thighs, between legs, and under tail pure white; upper surface of tail, hind border of buttocks, front edge of thighs, and under surface of tibiæ rich deep chestnut; rest of hind legs chestnut-brown, with black feet and hoofs. Hair for the most part stiff and straight, grey for greater part of length, the tips only being coloured. The white hair white throughout.

The above description is taken from the two animals, the larger of which weighed about forty pounds when fresh. I have also sent home a younger buck, with the tips of the horns only showing. The skeleton sent corresponds to this in age; and you will see that the horn-tip is merely a continuation of the pedicle, which, no doubt, shortens down to under cover of the fur-skin before the proper horn sprouts. You will observe from the skulls that as the animal grows older the pedicle shortens in length, and becomes stouter, especially near the hind part of the orbit. The lachrymal sinus also enlarges with age.

The females, of which I send two adult skins, in colour resemble the males, but have a black horseshoe-shaped patch on the forehead, the ends of the shoe running down the forehead, and overrunning the dark fleshy slit of the supraorbital furrow. In one the fore belly is rather dark.

The female of this new species might easily be confounded with that of *C. reevesi*; but the brighter colour of the latter, and her pure white chin and throat, will serve as distinguishing characters for the skin. In life, too, the latter stands distinct in displaying a longer body and limbs, has longer ears, and generally a lighter and more Antelope-like form, instead of the more porcine appearance of the new species.

Sclater's Muntjac is generally brought into this city alive, but nearly always more or less mangled about the feet, from the traps employed by the natives to catch them. The weather is also very cold at the time, and I know of no one here succeeding in keeping them alive. I bought several during the winter, but they all died within a few days of their captivity. They are extremely shy and timid, and cannot be induced to eat. We have also been very unsuccessful in rearing the spotted young.

On the mountain-ranges that separate this Province of Chekiang from the neighbouring Province of Ganhwuy a spotted Deer is found of about the size of the Axis, and, I suppose, the continental analogue of the Formosan *C. pseudaxis* (*taivanus*). The first intimation I received of its existence was in having a pair of horn-buds on a bit of frontlet brought me by a native, for which he wanted £5, the velvetty budding being a valuable Chinese medicine. The hair on the short pedicles was yellowish red, with a pure white border round the buds. Père Heude, of the Society of Jesuits at Sikawei, near Shanghai, who travels about the country collecting natural-history specimens for a museum they are about to erect in their establishment, told me that he also knew of its existence, and was further informed that Fokien hunters came yearly to Ganhwuy to hunt the bucks for their velvet. I have heard also from sportsmen at Shanghai that they have occasionally seen antlered Deer when on the hills at some distances from Shanghai; but up to the present I have sought the spotted Deer in vain.

While on the subject of Deer it would be as well to add what further information I have acquired about the Shanghai River-Deer,

HYDROPOTES INERMIS, Swinhoe.

This Deer is yearly becoming more numerous. It used to be confined chiefly to the marshy neighbourhood of Chinkiang, but is now found in moist grounds at no great distance from Shanghai. It is brought in large numbers to the Shanghai market during the winter months; and as many as thirty may be seen hanging up for sale at the same time. There can be no doubt of its great prolificness. The sportsmen in Shanghai all confirm the statement that I reported before, that the doe has many young at a birth. Mr. H. B. Russell, in the Imperial Customs at Chinkiang (son of Dr. Russell of the

'Times'), kindly undertook to question on this subject a friend of his there, who had had much experience in the pursuit of this Deer. He writes me:—"The gentleman I referred to tells me he has frequently found as many as four, five, and six young ones in a Deer; and you may be quite certain this information is correct." A gentleman at Chinkiang kept a pair alive running about in an unused compound for some time, but they never bred; but Père Armand David, who was here a few days back, assured me that a French friend of his at Shanghai had a pair of adults with two fawns, all alive and well. M. David has sent skins and skeletons to the Museum at the Jardin des Plantes. The tusks in the adult male grow to a large size, measuring fully two inches in length, and are, curiously enough, quite loose in their sockets, moving forwards and far backwards, and even a little sidewards. A long tuft of hair from the lower lip, immediately behind the tusk, forms a cushion for it to rest against; but the tooth is pressed backwards beyond this, and becomes almost hidden by the hair of the chin. The tusks are kept more frequently in this depressed state than erect in fang-form. The use of these tusks, people here declare, is for digging up roots to feed on; but as they are only possessed by the male, it is more probable that their intention is for offence and defence. The muscular power the animal has over them must give the teeth extra power and direction in use, as well as afford a means of protecting them, by admitting of their being withdrawn under cover of the bristly hair. Nevertheless they are very frequently found chipped or broken. The Chinese extract the tusks to make ornaments of. Finding them so often missing, and from the fact of their looseness when present, I was inclined to think that they were deciduous, like the antlers in the horned species, to which they correspond; but an examination of the base of an extracted tusk showed that such could not be. I am sending home a skeleton and two skins. I procured two fine bucks from Chinkiang during last winter; and as in my first description of this animal I described from the skin of an animal only two-thirds grown, I may be allowed to add the measurements of an adult.

Adult Male.

Muzzle to root of tail 3 ft.
Tail, root to tip of terminal hairs 4 in.
Height at shoulders 1 ft. 10 in., at rump 2 ft. 10 in.
Girth of neck 11½ in., behind shoulders 1 ft. 9 in., before thighs 1 ft. 9 in.
Length of head 7½ in.
Upper lip, outer surface to rictus angle, 2 in.
Tusk 2 in., its breadth ·45; quite loose.
Muzzle, tip to fore angle of eye 3½ in.
Eye, from angle to angle, ·85.
Lachrymal-fosse skin ·35.
Ear: long 4·7; its greatest breadth 2½; between ears 1·7.
Height of head behind eye 4.
Girth of muzzle 7 in., of head behind eye 11¼.

Elbow to tip of fore foot 1 ft. 3½ in.
Carpal joint to ditto 8¾ in.
Knee to tip of hind foot 19¼ in.
Tarsal joint to ditto 11¼ in.

These animals are light brown, speckled minutely with black in winter; as the spring advances, their heads, necks, and the fore part of their bodies lose the speckling and become light chestnut or yellowish brown. Hair on the crown short, thick, and close, a yellow scurfy substance being often abundant at the roots of the hair. The frontal skin shows no fleshy mark above the supraorbital furrow.

I learn from Mr. Russell that the fawn is spotted with dark brown spots all over the hind quarters.

From the boundary hills whence came the deer-horns was brought the skull of a magnificent Tiger (*Felis tigris*). The skull is one of the largest I have seen. A skin which I saw was of the short-haired southern breed.

Leopards (*Felis pardus*) have also been brought thence—the gutted carcass dried, with the skin enwrapping it (that is to say, attached to the forehead, feet, and tail) and in a fine state of preservation. How the body could be so thoroughly dried without injuring the skin was surprising. The hunters said that without the skin it would be hard to persuade purchasers of the genuineness of the article. They wanted seventy dollars for each entire animal. I told them I wanted the skulls of some Leopards. Some months after, they brought them to me, having sold the bodies and skins. They were of the ordinary species, the same that I procured at Canton (see P. Z. S. 1870, p. 628).

Viverricula malaccensis and *Mustela sibirica* are too numerous even within the city wall, destroying our poultry; and in addition to these two pests we have the Himalayan Ichneumon (*Urva cancrivora*, Hodgs.), which, living in abundance on the crab-frequented shores of a lake not far from here, is attracted by the crabs of our briny river to the neighbourhood of our houses, and there soon gains a taste for poultry and their eggs. *Viverra zibetha* has been shot among the bushes at the foot of our hills; and Père David, who was here from March to May, shot a *Paguma larvata* from the branch of a high tree near Hangchow. One *Nyctereutes procyonoides* was brought me by a hunter during the winter.

The Otter that frequents our lake I have procured a specimen of, and am sending it home, together with its skeleton. It seems to me darker on the under parts, and to have a narrower and deeper skull than *Lutra chinensis*, Gray. It may possibly be *L. swinhoii*, Gray. It is impossible to do any thing with the Otters without a series of good skins and skulls.

My bird-preserver brought three young Badgers here; and I bought one the other day at Shanghai, whither the country-people bring them to sell to our sportsmen to bait with dogs. It seems to be of the ordinary Chinese species, *Meles leptorhynchus*, A. M.-E. (*M. chinensis*, Gray) (see P. Z. S. 1870, p. 622).

Our woods resound with the metallic-sounding "chic-chic-chic-

chuck-chuck" of a Squirrel coloured a good deal like our South-China and Formosan Squirrel, but certainly distinct. It must be either the *Sc. griseipectus* or *Sc. chinensis*, both of J. E. Gray, or new. I have sent home a series of specimens with a separate skull or two; but it will be as well to give a sketch of it*.

I describe from a full-grown male with largely developed testes, about two-thirds the size of *Sc. castaneiventris* of South China, with lighter and greyer coat, pale buff belly, and broad puffy tail.

Teeth rich buff. Upper parts, head, breast, and legs olive-grey, finely tipped with black; yellower on the crown, back, rump, and tail; the latter very puffy, its hairs long, standing out clear of one another, each alternately ringed with black and olive-yellow, so as to give the appearance of longitudinal black stripes; the hairs at the tip of the tail black, with pale ends. Axillæ, belly, and inside of thighs light chestnut-buff (this varies in intensity in different individuals). Soles deep flesh-brown; claws black, with pale tips.

Length from snout to tip of tail 16½ inches, of body without head 6¼, of tail 8, of head 2½. Breadth between ears 1·3; depth of head 1·5. Height of ear ·9; breadth of ear ·6. Elbow-joint to end of toes 2·7. Tarsal joint to end of hind toes 2·1. Moustache bristles long and black. Eyes blackish brown. Ears rather short and somewhat rounded, clothed with short hairs. Scrotum black, and for the most part bare. Hairs of tail 2 inches long.

Père Heude spoke to me of a small striped *Glis* he had seen among the trees of our mountains. This will probably be the little rat-tailed *Sciurus m'clellandi*, which has such an extensive range in Southern China. I have not, however, met with it in this neighbourhood.

I am told the Rat of this place is small and peculiar, and not the *Mus decumanus*; but it appears to be scarce, and I have not yet got a specimen. A female of our red Field-Mouse, *Mus ningpoensis*, Swinh. (P. Z. S. 1870, p. 637), was brought to me while up country the other day, together with its nest and four little ones. The nest was laid at the bottom of a hole, and was composed almost entirely of the soft, silvery, silky, spikelets of a common grass (*Imperata koenigii*, Beauv.), intertwined with a few fibres of dried grass, as soft and warm as a feather-bed. The young had their eyes just beginning to open.

Sorex myosurus is here. I picked up an adult male in the garden that had been killed by dogs; but I have a little gem of a species caught by Mr. T. W. Kingsmill in his own garden at Shanghai. I have not seen any thing like it before.

I will finish this record of local Mammalia by noting that last September we disturbed some Bats in a ruin and secured one. It turned out to be *Phyllorhina swinhoii*, Peters (P. Z. S. 1870, p. 616); and on my last trip up country a countryman brought me four specimens of a light reddish-brown species, which, from its leaf-nose, also seems to be a *Phyllorhina*, and very probably of an undescribed species.

* A living Squirrel received from Mr. Swinhoe on the 9th of November appears to me to be *Sciurus griseipectus*.—P. L. S.

November 19, 1872.

The Viscount Walden, F.R.S., President, in the Chair.

Mr. Sclater called the attention of the Meeting to the two Livingstone expeditions into Inner Africa now in preparation, and urged the importance of endeavouring to have zoological collections made in the countries about to be visited by them.

The following papers were read:—

1. Additional Notes on the Breeding of the Hippopotamus in the Society's Gardens. By A. D. Bartlett, Superintendent of the Gardens.

[Received November 17, 1872.]

Since the publication of my notes in the 'Proceedings' of the Society for 1871 (p. 255 *et seqq.*) two opportunities have been afforded me of making observations upon the breeding of the Hippopotamus, and I have some additional remarks to offer upon this subject.

The subjoined table gives the dates of the last copulation which took place in each case before the birth of a young one in the Society's Gardens, together with the dates of birth, showing the period of gestation and the number of days. In these some differences appear to have occurred; but I believe the dates to be correct, and to have been carefully noted by the keepers. It is, however, possible that trifling errors may have been made.

	Sex of young.	Date of last Copulation of parents.	Date of Birth.	Period of Gestation.
I.	♂	June 29, 1870	Feb. 21, 1871	237
II.	♀	May 27, 1871	Jan. 7, 1872	227
III.	♂	March 9, 1872	Nov. 5, 1872	242

About 12 o'clock A.M. on the 4th of November 1872, I observed that the female Hippopotamus was showing symptoms of displeasure at being looked at; and as many of the visitors were expecting she was about to bring forth her young one, they lingered longer in front of her den than usual, and this watchfulness on their part annoyed her. Seeing this, I at once closed the house, and gave instructions not to allow any one to go *near her*, or to *be seen* by *her*; in fact, the most perfect quietness was immediately put in full force: and I have no doubt the easy delivery of the young one was due principally to the very strict and faithful manner in which the two keepers (Prescot and Thomson) carried out my wishes; for soon after the house was closed she settled down, and remained undisturbed until about 7 o'clock the next morning. At fifteen minutes past seven the young one was born; and the condition of the female upon this occasion differed greatly from her former state, described in the notes before referred to.

She was perfectly quiet; and the young one walked about soon

after its birth, and in the course of three or four hours was seen sucking. The sucking at first took place when the female was lying partly on her side, and was of short duration; and the young one wandered up and down by her side evidently looking for food. The mother soon went into the water, followed by the young one; and here they passed a considerable time. When she left the water she was closely followed by the little one; and it was generally after leaving the water that the young one sucked. We now observed the female stood up with her back raised and arched, while the little one would lie down under her teats and suck for a considerable time; and so freely did the milk come from the mother that the face of the young one was sometimes quite white with it.

Notwithstanding these favourable conditions, we had the greatest difficulty in approaching the female Hippopotamus to give her food or to clean out the den, so savage did she become on the entrance into the house even of her keeper. The furious champing of her jaws, the rushing forward against the iron bars, and smashing about, caused us much alarm lest she should injure the young one during these moments of fury; in fact, upon one or two occasions she opened her ponderous jaws in a threatening manner at the little one, and made us tremble for its safety. It was a great relief, however, to find how very little the young one seemed to mind her threats; for it soon commenced to open its mouth as wide as possible, and threaten its mother.

The time thus passed on until the morning of the 12th. This morning I was surprised to find the two keepers in her house, standing in front of her den, while she was engaged eating her food as tamely and quietly as it was possible for her to be, the young one not as usual by her side, but altogether out of sight. The men called to me, as I entered the building, and expressed their sad and melancholy looks by telling me that the young one was dead—for they had been in the house some time at work, and no young one could be seen in or out of the water,—and, moreover, that the mother had probably killed it, as she was feeding, apparently glad to be no longer troubled about it. Not feeling certain that they had been careful enough in watching the tank, in which they supposed the dead young one to be lying at the bottom, I went close to the side of the tank, and looked with the most anxious care for the slightest ripple in the water. The corners and every part were closely watched for upwards of five or six minutes without discovering any signs of life.

I consulted with the men what it would be best to do; and we determined to let the water out of the tank, as it appeared to us useless to allow the then supposed defunct beast to lie at the bottom any longer. Therefore, in order to remove the plug to empty the tank, the iron gate must be closed; and this was about to be done. No sooner, however, than the mother saw the gate was being closed, she rushed at it, forced it back, and passed into the water, uttering her loud roaring grunt, and diving about in the tank. To our utter astonishment up came the head of the little one, shaking the water out of its ears, and looking as if just awake.

We left the house astounded and bewildered, looking at each other, and wondering if our eyes and other senses would agree upon comparing notes of what had happened. I am perfectly certain, and I have two trustworthy witnesses who are as positive as myself, that the young Hippopotamus must have been under water without the opportunity of taking breath for at least fifteen minutes. I may mention that the adult Hippopotamus has been timed, when under water, by a great number of very careful observers very many times, and on no occasion has it remained below above three and a half to four minutes without taking breath. This long continuance under water by the young animal induces me to believe that in the first few days of its existence it takes its nourishment, or part of it, from the teats of its mother under water.

Within the last twenty-four hours, I find the little one takes rest in the manner described by African travellers, viz. on its mother's back. Both yesterday and again this day the little one has been lying lengthwise on the broad shoulders of its mother, its little head reaching halfway up her neck. During this time she was floating in the water; and no doubt in a state of nature the young are carried about in the rivers by their parents in this manner. The young one already appears willing to feed itself, and, I am inclined to think, will do so in a few days. It is extremely lively, and not only playful, but opens its mouth in a threatening manner at the keepers. This habit has only been observed the last day or two; for at first on the least alarm it used to rush into the water for safety.

2. Note on the Placenta of the Hippopotamus.

By A. H. Garrod, B.A., F.Z.S., Prosector to the Society.

[Received November 19, 1872.]

Not knowing of any description of the placenta of *Hippopotamus amphibius*, I think it desirable to record the condition of that obtained after the birth of the calf, which occurred on the 5th of this month.

The placenta is a long cylindrical bag, three and a half feet from end to end and one and a half foot across. There is only one aperture; and that is not more than a foot long, and is situated at one of the ends. The other end is rounded, and quite complete. It is evident that the whole viscus is much the shape of the enclosed fœtus, and must have closely covered it. The end at which the rupture had occurred, that is the one situated at the os uteri, is a little constricted, as may be inferred from the above statement of its diameter. The umbilical cord is attached to the placenta at one of the sides, about halfway between the two ends. It is one foot and a half long, and ragged at its free extremity. It is an inch and a half in diameter in the middle, and gets larger as it approaches its attachment, near which there are many spherical bodies, as big as peas and yellow in colour, supported on short amniotic pedicles. The outer surface of the whole viscus is covered uniformly with villi

of a bright red colour; and there is no reduction of their number, nor in their size, at the cæcal end at all. At the lacerated extremity, close to the rupture they are paler and more scattered. The walls of the viscus are of uniform thickness, except for a few inches round the point of attachment of the cord, where the vessels commence to diffuse themselves.

When received, the whole sac was turned inside out; and this was probably the result of the gradual contraction of the uterus from fundus to orifice. It may be remarked that for a few days after the birth of the calf, the mother had a considerable prolapse of the vagina, which gradually diminished, and is now very slight.

3. On the Habits of the Vizcacha (*Lagostomus trichodactylus*). By W. H. Hudson, C.M.Z.S.

[Received September 10, 1872.]

The Vizcachas in the pampas of Buenos Ayres live in societies, usually numbering twenty or thirty members. The village (called here "Vizcachera") is composed of a dozen or fifteen burrows or mouths; for one entrance often serves for two or more distinct holes. Often, where the ground is soft, there are twenty or thirty or more burrows in an old vizcachera; but on stony, or "tosca," soil even an old one may have no more than four or five burrows. They are deep wide-mouthed holes, placed very close together, the entire village covering an area of from 100 to 200 square feet of ground.

The burrows vary greatly in extent; and usually in a vizcachera there are several that, at a distance of from 4 to 6 feet from the entrance, open into large circular chambers. From these chambers other burrows diverge in all directions, some running horizontally, others obliquely downwards to a maximum depth of 6 feet from the surface: some of these burrows or galleries communicate with those of other burrows. A vast amount of loose earth is thus brought up, and forms a very irregular mound, 15 to 30 inches above the surrounding level.

It will afford some conception of the numbers of these vizcacheras on the settled pampas when I say that, in some directions, a person might ride 500 miles and never advance half a mile without seeing one or more of them. In districts where, as far as the eye can see, the plains are as level and smooth as a bowling-green, especially in winter when the grass is close-cropped, and where the rough giant-thistle has not sprung up, these mounds appear like brown or dark spots on a green surface. They are the only irregularities that occur to catch the eye, and consequently form an important feature in the scenery. In some places they are so near together that a person on horseback might count a hundred of them from one point of view.

The sites of which the Vizcacha invariably makes choice to work on, as well as his manner of burrowing, adapt him peculiarly to live and thrive on the open pampas. Other burrowing species seem

always to fix upon some spot where there is a bank or a sudden depression in the soil, or where there is rank herbage, or a bush or tree, about the roots of which to begin their kennel. They are averse to commence digging on a clean and level surface, either because it is not easy for them where they have nothing to rest their foreheads against while scratching, or because they possess a wary instinct that impels them to place the body in concealment whilst working on the surface, thus securing the concealment of the burrow after it is made. Certain it is that where large hedges have been planted on the pampas, multitudes of Opossums, Weazels, Skunks, Armadillos, &c. come and make their burrows beneath them; and where there are no hedges or trees, all these species make their kennels under bushes of the perennial thistle, or where there is a shelter of some kind. The Vizcacha, on the contrary, chooses an open level spot, the cleanest he can find to burrow on. The first thing that strikes the observer when viewing the vizcachera closely is the enormous size of the entrance of the burrows, or, at least, of several of the central ones in the mound; for there are usually several smaller outside burrows. The pit-like opening to some of these principal burrows is often 4 to 6 feet across the mouth, and sometimes deep enough for a tall man to stand up waist-deep in. How these large entrances can be made on a level surface may be seen when the first burrow or burrows of an incipient vizcachera are formed. It is not possible to tell what induces a Vizcacha to be the founder of a new community; for they increase very slowly, and furthermore are extremely fond of each other's society; and it is invariably one individual that leaves his native burrows to make a new and independent one. If it were to have better pasture at hand, then he would certainly remove to a considerable distance; but he merely goes from 15 to 50 or 60 yards off to begin his work. Thus it is that in desert places, where these animals are rare, a solitary vizcachera is never seen; but there are always several close together, though there may be no others on the surrounding plain for leagues. When the Vizcacha has made his habitation, it is but a single burrow, with only himself for an inhabitant, perhaps for many months. Sooner or later, however, others join him: and these will be the parents of innumerable generations; for they construct no temporary lodging-place, as do the Armadillos and other species, but their posterity continues in the quiet possession of the habitations bequeathed to it; how long, it is impossible to say. Old men who have lived all their lives in one district remember that many of the vizcacheras around them existed when they were children. It is invariably a male that begins a new village, and makes his burrow in the following manner, though he does not always observe the same method. He works very straight into the earth, digging a hole 12 or 14 inches wide, but not so deep, at an angle of about 25° with the surface. But after he has progressed inwards a few feet, the Vizcacha is no longer satisfied with merely scattering away the loose earth he fetches up, but cleans it away so far in a straight line from the entrance, and scratches so much on this line (apparently to make the slope gentler), that he soon forms a

trench a foot or more in depth, and often three or four feet in length. Its use is, as I have inferred, to facilitate the conveying of the loose earth as far as possible from the entrance of the burrow. But after a while the animal is unwilling that it should accumulate even at the end of this long passage; he therefore proceeds to form two additional trenches, that form an acute, sometimes a right angle, converging into the first, so that when the whole is completed it takes the form of a capital Y.

These trenches are continually deepened and lengthened as the burrow progresses, the angular segment of earth between them scratched away, until by degrees it has been entirely conveyed off, and in its place is the one deep great unsymmetrical mouth I have already described. There are soils that will not admit of the animals working in this manner. Where there are large cakes of "tosca" near the surface, as in many localities on the southern pampas, the Vizcacha makes his burrow as best he can, and without the regular trenches. In earths that crumble much, sand or gravel, he also works under great disadvantages.

The burrows are made best in the black and red moulds of the pampas; but even in such soils the entrances of many burrows are made differently. In some the central trench is wanting, or is so short that there appear but two passages converging directly into the burrow; or these two trenches may be so curved inwards as to form the segment of a circle. Many other forms may also be noticed, but usually they appear to be only modifications of the most common Y-shaped system.

As I have remarked that its manner of burrowing has peculiarly adapted the Vizcacha to the pampas, it may be asked what particular advantage a species that makes a wide-mouthed burrow possesses over those that excavate in the usual way. On a declivity, or at the base of rocks or trees, there would be none; but on the perfectly level and shelterless pampas, the durability of the burrow, a circumstance favourable to the animal's preservation, is owing altogether to its being made in this way, and to several burrows being made together. The two outer trenches diverge so widely from the mouth that half the earth brought out is cast behind instead of before it, thus creating a mound of equal height about the entrance, by which it is secured from water during great rainfalls, while the cattle avoid treading over the great pit-like entrances. But the burrows of the Hare, Armadillo, and other species, when made on perfectly level ground, are soon trod on and broken in by cattle; in summer they are choked up with dust and rubbish; and, the loose earth having all been thrown up together in a heap on one side, there is no barrier to the water which in every great rainfall flows in and obliterates the kennel drowning or driving out the tenant.

I have been minute in describing the habitations of the Vizcacha, as I esteem the subject of prime importance in considering the zoology of this portion of America. The Vizcacha does not benefit himself alone by his perhaps unique style of burrowing; but this habit has proved advantageous to several other species, and has been

so favourable to two of our birds that they are among the most common species found here, whereas without these burrows they would have been exceedingly rare, since the natural banks in which they breed are scarcely found any where on the pampas. I refer to the Minera (*Geositta cunicularia*), which makes its breeding-holes in the bank-like sides of the Vizcacha's burrow, and to the little Swallow (*Atticora cyanoleuca*) which breeds in these excavations when forsaken by the Minera. Few old vizcacheras are seen without some of these little parasitical burrows in them.

Birds are not the only beings in this way related to the Vizcachas: the Fox and the Weasel of the pampas live almost altogether in them. Several insects also frequent these burrows that are seldom found anywhere else. Of these the most interesting are:—a large predacious nocturnal bug, shining black, with red wings; a nocturnal *Cicindela*, a beautiful insect, with dark green striated shards and pale red legs; also a genus of diminutive wingless Wasps. Of the last I have counted six species, most of them marked with strongly contrasted colours, black, red, and white. There are also other Wasps that prey on the Spiders found on the vizcachera. All these and others are so numerous on the mounds that dozens of them might there be collected any summer day; but if sought for in other situations they are exceedingly rare. If the dry mound of soft earth which the Vizcacha elevates amidst a waste of humid, close-growing grass is not absolutely necessary to the existence of all these species, it supplies them with at least one favourable condition, and without doubt thereby greatly increases their numbers: they, also, whether predacious or preyed on, have so many relations with other outside species, and these again with still others, that it would be no mere fancy to say that probably hundreds of species are either directly or indirectly affected in their struggle for existence by the vizcacheras so abundantly sprinkled over the pampas.

In winter the Vizcachas seldom leave their burrows till dark, but in summer come out before sunset; and the vizcachera is then a truly interesting spectacle. Usually one of the old males first appears, and sits on some prominent place on the mound, apparently in no haste to begin his evening meal. When approached from the front he stirs not, but eyes the intruder with a bold indifferent stare. If the person passes to one side, he deigns not to turn his head.

Other Vizcachas soon begin to appear, each one quietly taking up his station at his burrow's mouth, the females, known by their greatly inferior size and lighter grey colour, sitting upright on their haunches, as if to command a better view, and indicating by divers sounds and gestures that fear and curiosity struggles in them for mastery; for they are always wilder and sprightlier in their motions than the males. With eyes fixed on the intruder, at intervals they dodge the head, emitting at the same time an internal note with great vehemence; and suddenly, as the danger comes nearer, they plunge simultaneously, with a startled cry, into their burrows. But in some, curiosity is the strongest emotion: for, in spite of their fellow's contagious example, and already half down the entrance, again they start

up to scrutinize the stranger, and will then often permit him to walk within five or six paces of them.

Standing on the mound there is frequently a pair of Burrowing Owls (*Pholeoptynx cunieularia*). These birds generally make their own burrows to breed in, or sometimes take possession of one of the lesser outside burrows of the village; but their favourite residence, when not engaged in tending their eggs or young, is on the vizcachera. Here a pair will sit all day; and I have often remarked a couple close together on the edge of the burrow; and when the Vizcacha came out in the evening, though but a hand's breadth from them, they did not stir, nor did he notice them, so accustomed are these creatures to each other. Usually a couple of the little burrowing *Geositta* are also present. They are lively creatures, running with great rapidity about the mound and bare space that surrounds it, suddenly stopping and jerking their tails in a slow deliberate manner, and occasionally uttering their cry, a trill, or series of quick short clear notes, resembling somewhat the shrill excessive laughter of a child. Among the grave, stationary Vizcachas of which they take no heed, perhaps half a dozen or more little Swallows (*Atticora cyanoleuca*) are seen, now clinging altogether to the bank-like entrance of a burrow, now hovering over it in a moth-like manner, as if uncertain where to alight, and anon sweeping about in circles, but never ceasing their low and sorrowful notes.

The vizcachera with all its incongruous inhabitants thus collected upon it is to a stranger one of the most novel sights the pampas afford.

The Vizcacha appears to be a rather common species over all the extensive Argentine territory; but they are so exceedingly abundant on the pampas inhabited by man, and comparatively so rare in the desert places I have been in, that I was at first much surprised at finding them so unequally distributed. I have also mentioned that the Vizcacha is a tame familiar creature. This is in the pastoral districts, where they are *never* disturbed; but in wild regions, where he is scarce, he is exceedingly wary, coming forth long after dark, and plunging into his burrow on the slightest alarm, so that it is a rare thing to get a sight of him. The reason is evident enough: in desert regions the Vizcacha has several deadly enemies in the larger rapacious Mammals. Of these the Puma or Lion (*Felis concolor*) is the most numerous, as it is also the swiftest, most subtle, and most voracious; for, as regards these traits, the Jaguar (*F. onca*) is an inferior animal. To the insatiable bloody appetite of this creature nothing comes amiss; he takes the male ostrich by surprise, and slays that wariest of wild things on his nest; he captures little birds with the dexterity of a cat, and hunts for diurnal Armadillos; he comes unawares upon the Deer and Guanaco, and, springing like lightning on them, dislocates their necks before their bodies touch the earth. Often after he has thus slain them, he leaves their bodies untouched for the *Polyborus* and Vulture to feast on, so great a delight does he take in destroying life *. The Vizcacha falls an easy victim to this

* The character of this animal (*Felis concolor*) has, I believe, been always misunderstood, and its true history is consequently yet unwritten. Of the fables

subtle creature; and it is not to be wondered at that it becomes wild to excess and rare in regions hunted over by such an enemy, even when all other conditions are favourable to its increase. But as soon as these wild regions are settled by Man, the Lions are exterminated, and the sole remaining foe of the Vizcacha is the Fox, comparatively an insignificant one.

The Fox takes up his residence in a vizcachera, and succeeds, after some quarrelling (manifested in snarls, growls, and other subterranean warlike sounds), in ejecting the rightful owners of one of the burrows, which forthwith becomes his. Certainly the Vizcachas are not much injured by being compelled to relinquish the use of one of their kennels for a season; for, if the locality suits him, the Fox remains with them all winter. Soon they grow accustomed to the unwelcome stranger; he is quiet and unassuming in demeanour, and often in the evening sits on the mound in their company, until they regard him with the same indifference they do the Burrowing Owl. But in spring, when the young Vizcachas are large enough to leave their cells, then the Fox makes them his prey; and if it is a bitch Fox, with a family of eight or nine young to provide for, she will grow so bold as to hunt her helpless quarry from hole to hole, and do battle with the old ones, and carry off the young in spite of them, so that all the young animals in the village are eventually destroyed. Often when the young Foxes are large enough to follow their mother, the whole family takes leave of the vizcachera where such cruel havoc has been made, and settle in another, there to continue their depredations. But the Fox has ever a relentless foe in Man, and meets with no end of bitter persecutions; it is consequently much more abundant in desert or thinly settled districts than in such as are populous, so that in these the check the Vizcachas receive from the Foxes is not appreciable.

The abundance of cattle on the pampas has made it unnecessary to use the Vizcacha as an article of food. His skin is of no value; therefore Man, the destroyer of his enemies, has hitherto been the greatest benefactor of his species. Thus they have been permitted to multiply and spread themselves to an amazing extent, so that the half-domestic cattle on the pampas are not nearly so familiar with Man or so fearless of his presence as are the Vizcachas. It is not that they do him no injury, but because they do it indirectly, that they have so long enjoyed immunity from persecution. It is amusing to see the grain-farmer, the greatest sufferer from the Vizcachas, regarding them with such indifference as to permit them to swarm on his "run," and burrow within a stone's throw of his dwelling with impunity, and yet going a distance from home to persecute with unreasonable animosity a Fox, Skunk, or other fierce creature. From the latter the loss he sustains in a twelvemonth's time is perhaps a dozen chickens and twice

---

that popular works on natural history go on eternally repeating, there is one that deserves a distinguished place for its absurdity; and that is, that the South-American Lion is the most cowardly of all animals, so that a woman or a child may put it to flight.

as many eggs; whilst, but for the Vizcachas, that ruin the grass and occupy so much ground with their burrows, he could increase his years's income by one or two hundreds of pounds sterling. That the Vizcacha has comparatively no adverse conditions to war with wherever man is settled is evident when we consider their very slow rate of increase and yet see them in such incalculable numbers. The female has but one litter in the year. She becomes pregnant late in April, and brings forth in September; the period of gestation is, I think, rather less than five months. She has but two young; this, however, is not invariably the case, as I have opened one female containing three, and therefore think it probable that they may sometimes have as many as four.

The Vizcacha is about two years growing. A full-sized male measures to the root of the tail 22 inches, and weighs from 14 to 15 pounds; the female is 19 inches in length, and her greatest weight 9 pounds. Probably it is a long-lived, and certainly it is a very hardy animal. Where it has any green substance to eat, it never drinks water; but after a long summer drought, when for months they have subsisted on bits of dried thistle-stalks and old withered grass, if a shower falls they will come forth from their burrows even at noonday and drink eagerly from the pools. It has been erroneously stated that they subsist on roots. Their food is grass and seeds; but they may also sometimes eat roots, as the ground is occasionally seen scratched up about the burrows. In March, when the stalks of the perennial cardoon or Castile thistle (*Echinops ritro*) are dry, the Vizcachas fell them by gnawing about their roots, and afterwards tear to pieces the great dry flower-heads to get the seeds imbedded deeply in them, of which they seem very fond. Large patches of thistle are often found served thus, the ground about them literally white with the silvery bristles they have scattered. This cutting down tall plants to get the seeds at the top, seems very like an act of pure intelligence; but the fact is, the Vizcachas cut down every tall plant they can. I have seen whole acres of maize destroyed by them, yet the plants cut down were left untouched. If posts be put into the ground within range of their nightly rambles, they will gnaw till they have felled them, unless of a wood hard enough to resist their chisel-like incisors.

The strongest instinct of this animal is to clear the ground thoroughly about its burrows; and it is this destructive habit that makes it necessary for cultivators of the soil to destroy all the Vizcachas in or near their fields. On the uninhabited pampas, where the long grasses grow, I have often admired the vizcachera; for it is there the centre of a clean space, often of half an acre in extent, on which there is an even close-shaven turf: this clearing is surrounded by the usual rough growth of herbs and giant grasses. In such situations this habit of clearing the ground is eminently advantageous to them, as it affords them a comparatively safe spot to feed and disport themselves on, and over which they can fly to their burrows without meeting any obstruction, on the slightest alarm.

Of course the instinct continues to operate where it is no longer

of any advantage. In summer, when the thistles are green, even when growing near the burrows, and the giant thistle (*Carduus mariana*) springs up most luxuriantly right on the mound, the Vizcachas will not touch them, either disliking the strong astringent sap or repelled by the thorns with which they are armed. As soon as they dry, and the thorns become brittle, they are levelled; and afterwards, when the animal begins to drag them about and cut them up, as his custom is, he accidentally discovers and feasts on the seed. For Vizcachas are fond of exercising their teeth on hard substances, such as sticks and bones, just as cats are of "sharpening their claws" on trees.

Another remarkable habit of the Vizcacha, that of dragging to and heaping about the mouth of his burrow every stalk he cuts down, and every portable object that by dint of great strength he can carry, has been mentioned by Azara, Darwin, and others. On the level plains it is a useful habit; for as the Vizcachas are continually deepening and widening their burrows, the earth thrown out soon covers up these materials, and so assists in raising the mound. On the Buenos-Ayrean pampas numbers of vizcacheras would annually be destroyed by water in the great sudden rainfalls were the mounds less high. But this is only an advantage when the animals inhabit a perfectly level country subject to flooding rains; for where the surface is unequal they invariably prefer high to low ground to burrow on, and are thus secured from destruction by water; yet the instinct is as strong in such situations as on the level plains. The most that can be said of a habit apparently so obscure in its origin and uses is, that it appears to be part of that instinct (to which so little attention has been paid) of clearing the ground about the village. Every tall stalk the Vizcacha cuts down, every portable object he finds, must be removed to make the surface clean and smooth; but while encumbered with it he does not proceed further from his burrows, but invariably retires towards them, and so deposits it upon the mound. So well known is this habit, that whatever article is lost by night—whip, pistol, or knife—the loser next morning visits the vizcacheras in the vicinity, quite sure of finding it there. People also visit the vizcacheras to pick up sticks for firewood.

The Vizcachas are cleanly in their habits; and the fur, though it has a strong earthy smell, is kept exceedingly neat *. They have

* Have none of the great anatomists ever made a special study of the Vizcacha? The hind leg and foot afford a very beautiful instance of adaptation. Propped by the hard curved tail, they sit up erect and as firmly on the long horny disks on the undersides of the hind legs as a man stands on his feet. Most to be admired, on the middle toe the skin thickens into a round cushion, in which the curved teeth-like bristles are set; nicely graduated in length, so that "each particular hair" may come into contact with the skin when the animal scratches or combs itself. As to the uses of this appendage there can be no difference of opinion, as there is about the serrated claw in birds. It is quite obvious that the animal cannot scratch himself with his hind paw (as all mammals do) without making use of this natural comb. Then the entire foot is modified, so that this comb shall be well protected and yet not be hindered from performing its office: thus the inner toe is pressed close to the middle one, and

a remarkable way of dusting themselves: the animal suddenly throws himself on his back, and, bringing over his hind legs towards his head, depresses them till his feet touch the ground. In this strange posture he scratches up the earth with great rapidity, raising a little cloud of dust, then rights himself with a jerk, and, after an interval, repeats the dusting. Usually they scratch a hole in the ground to deposit their excrements in. Whilst opening one of the outside burrows that had no communication with the others, I once discovered a vast deposit of their dung (so great that it must have been accumulating for years) at the extremity. To ascertain whether this be a constant or only a casual habit, it would be necessary to open up entirely a vast number of vizcacheras. When a Vizcacha dies in his burrow, the carcass is, after some days, dragged out and left upon the mound.

The language of the Vizcacha is wonderful for its variety. When the male is feeding he frequently pauses to utter a succession of loud, percussive, and somewhat jarring cries; these he utters in a leisurely manner, and immediately after goes on feeding. Often he utters this cry in a low grunting tone. One of his commonest expressions sounds like the violent hawking of a man clearing his throat. At other times he bursts into piercing tones that may be heard a mile off, beginning like the excited and quick-repeated squeals of a young pig, and growing longer, more attenuated, and quavering towards the end. After retiring alarmed into the burrows, he repeats at intervals a deep internal moan. All these, and many other indescribable guttural, sighing, shrill, and deep tones, are varied a thousand ways in strength and intonation according to the age, sex, or emotions of the individual; and I doubt if there is in the world any other four-footed thing so loquacious or with a dialect so extensive. I take great pleasure in going to some spot where they are abundant, and sitting quietly to listen to them; for they are holding a perpetual discussion all night long, which the presence of a human being will not interrupt.

At night, when the Vizcachas are all out feeding, in places where they are very abundant (and in some districts they literally swarm) any very loud and sudden sound, as the report of a gun or a clap of unexpected thunder, will produce a most extraordinary effect. No sooner has the report broken on the stillness of night than a perfect storm of cries bursts forth over the surrounding country. After eight or nine seconds there is in the sounds a momentary lull or pause; and then it breaks forth again, apparently louder than before. There is so much difference in the tones of different animals that the cries of individuals

so depressed that it comes under the cushion of skin and cannot possibly get before the bristles, or interfere with their coming against the skin in scratching, as would certainly be the case if this toe were free as the outer one.

Again, the Vizcachas appear to form the deep trenches before the burrows by scratching the earth violently backwards with the hind claws. Now these straight, sharp, dagger-shaped claws, and especially the middle one, are so long that the Vizcacha is able to perform all this rough work without the bristles coming into contact with the ground and so getting worn by the friction. The Tehuelcho Indians comb their hair with a brush-comb very much like that on the Vizcacha's toe, but it is sad to think that they (the Tehuelchos) make so little use of it.

close at hand may be distinguished amidst the roar of blended voices coming from a distance. It sounds as if thousands and tens of thousands of them were striving to express every emotion at the highest pitch of their voices; so that the effect is indescribable, and fills a stranger with astonishment. Should a gun be fired off several times, their cries become less each time; and after the third or fourth time it produces no effect. They have a peculiar, sharp, sudden, "far-darting" alarm-note when a dog is spied, that is repeated by all that hear it, and produces an instantaneous panic, sending every Vizcacha flying to his burrow.

But though they manifest such a terror of dogs when out feeding at night (for the slowest dog can overtake them), in the evening, when sitting upon their mounds, they treat them with tantalizing contempt. If the dog is a novice, the instant he spies the animal he rushes violently at it; the Vizcacha waits the charge with imperturbable calmness till his enemy is within one or two yards, and then disappears into the burrow. After having been foiled this way many times, the dog resorts to stratagem: he crouches down as if transformed for the nonce into a *Felis*, and steals on with wonderfully slow and cautious steps, his hair bristling, tail hanging, and eyes intent on his motionless intended victim: when within 7 or 8 yards he makes a sudden rush, but invariably with the same disappointing result. The persistence with which the dogs go on hoping against hope in this unprofitable game, in which they always act the stupid part, is highly amusing, and is very interesting to the naturalist; for it shows that the native dogs on the Pampas have developed a very remarkable instinct, and one that might be perfected by artificial selection; but dogs with the hunting habits of the cat would, I think, be of little use to man. When it is required to train dogs to hunt the nocturnal Armadillo (*Dasypus villosus*), then this deep-rooted (and, it might be added, hereditary) passion for Vizcachas is excessively annoying, and it is often necessary to administer hundreds of blows and rebukes before a dog is induced to track an armadillo without leaving the scent every few moments to make futile grabs at his old enemies.

The following instance will show how little suspicion of man the Vizcachas have. A few years ago I went out shooting them on three consecutive evenings. I worked in a circle, constantly revisiting the same burrows, never going a greater distance from home than could be walked in four or five minutes. During the three evenings I shot sixty Vizcachas dead; and probably as many more escaped badly wounded into their burrows; for they are hard to kill, and however badly wounded, if sitting near the burrow when struck, are almost certain to escape into it. But on the third evening I found them no wilder, and killed about as many as on the first. After this I gave up shooting them in disgust; it was dull sport, and to exterminate or frighten them away with a gun seemed an impossibility.

It is a very unusual thing to eat the Vizcacha, most people, and especially the gauchos, having a silly unaccountable prejudice against

their flesh. I have found it very good, and while engaged writing this paper have dined on it served up in various ways. The young animals are rather insipid, the old males tough, but the mature females are excellent—the flesh being tender, exceedingly white, fragrant to the nostrils, and with a very delicate game-flavour. It is certainly infinitely superior to that of the Hairy Armadillo and the Ostrich: yet of the flesh of these, loaded with strong-smelling and rank-tasting yellow fat as it is, people in Buenos Ayres are immoderately fond.

Within the last ten years so much new land has been brought under cultivation that farmers have been compelled to destroy incredible numbers of Vizcachas: many large "estancieros" (cattle-breeders) have followed the example set by the grain-growers, and have had them exterminated on their estates. Now all that Azara, on hearsay, tells about the Vizcachas perishing in their burrows, when these are covered up, but that they can support life thus buried for a period of ten or twelve days, and that during that time animals will come from other villages and disinter them, unless frightened off with dogs, is strictly true. Country workmen are so well acquainted with these facts that they frequently undertake to destroy all the vizcacheras on an estate for so paltry a sum as tenpence in English money for each one, and yet will make double the money at this work than they can at any other. By day they partly open up, then cover up the burrows with a great quantity of earth, and by night go round with dogs to drive away the Vizcachas from the still open burrows that come to dig out their buried friends. After all the vizcacheras on an estate have been thus served, the workmen are usually bound by previous agreement to keep guard over them for a space of eight or ten days before they receive their hire; for the animals covered up are then supposed to be all dead. Some of these men I have talked with have assured me that living Vizcachas have been found after fourteen days—a proof of their great endurance. There is nothing strange, I think, in the mere fact of the Vizcacha being unable to work his way out when thus buried alive; for, for all I know to the contrary, other species may, when their burrows are well covered up, perish in the same manner; but it certainly is remarkable that other Vizcachas should come from a distance to dig out those that are buried alive. In this good office they are exceedingly zealous; and I have frequently surprised them after sunrise, at a considerable distance from their own burrows, diligently scratching at those that had been covered up. The Vizcachas are fond of each other's society, and live peaceably together: but their goodwill is not restricted to the members of their own little community; it extends to the whole species, so that as soon as night comes many animals leave their own and go to visit the adjacent villages. If one approaches a vizcachera at night, usually some of the Vizcachas on it scamper off to distant burrows: these are neighbours merely come to pay a friendly visit. This intercourse is so frequent that little straight paths are formed from one vizcachera to another. The extreme attachment between

members of different communities makes it appear less strange that they should assist each other: either the desire to see, as usual, their buried-up neighbours becomes intense enough to impel them to work their way to them; or cries of distress from the prisoners reach and incite them to attempt their deliverance. Many social species are thus powerfully affected by cries of distress from one of their fellows; and some will attempt a rescue in the face of great danger —the Weazel and the Peccary for example.

Mild and sociable as the Vizcachas are towards each other, each one is exceedingly jealous of any intrusion into his particular burrow, and indeed always resents such a breach of discipline with the utmost fury. Several individuals may reside in the compartments of the same burrow; but beyond themselves not even their next-door neighbour is permitted to enter; their hospitality ends where it begins, at the entrance. It is difficult to compel a Vizcacha to enter a burrow not his own; even when hotly pursued by dogs they often refuse to do so. When driven into one, the instant their enemies retire a little space they rush out of it, as if they thought the hiding-place but little less dangerous than the open plain. I have frequently seen Vizcachas, chased into the wrong burrows, summarily ejected by those inside; and sometimes they make their escape only after being well bitten for their offence.

I have now given you the most interesting facts I have collected concerning the Vizcacha: when others rewrite its history they doubtless will, according to the opportunities of observation they enjoy, be able to make some additions to it, but probably none of great consequence. I have observed this species in Patagonia and Buenos Ayres only; and as I have found that its habits are considerably modified by circumstances in the different localities where I have met with it, I am sure that other variations will occur in the more distant regions, where it is influenced by other extraneous conditions.

4. On the Size of the Red Corpuscles of the Blood of the *Salmonidæ* and some other Vertebrates. By George Gulliver, F.R.S.

[Received September 30, 1872.]

Physiologists have now recognized the great importance in all the vertebrate classes of the comparative magnitude of the red blood-corpuscles, as noticed in my memoir on those of *Moschus*, *Tragulus*, *Oryeteropus*, &c. in the 'Proceedings' of this Society, February 10, 1870, wherein also are given some facts supplementary to those in the same 'Proceedings,' February 25, 1862, and in my Lectures, reported and illustrated by engravings in the 'Medical Times and Gazette,' 1862–63, concerning the value of the characters afforded by these corpuscles in systematic zoology.

The red blood-corpuscles of the *Salmonidæ* are the largest that I

have yet examined of the osseous fishes. Referring to my MS. notes, and to my papers in the 'Proceedings of the Zoological Society,' February 22, 1848, and February 25, 1862, both of which were published since my Tables of Measurements in the Sydenham Society's edition of Hewson's Works, these blood-corpuscles of the genera *Salmo* and *Thymallus* appear to be at least a third larger than the corresponding corpuscles of most other osseous fishes. The fact seemed so remarkable and exceptional as to require further observations; and, accordingly, I have lately again obtained blood from fresh salmon and trout, and carefully measured the red corpuscles, and compared them with my old dried specimens from the same species of fish.

The results have all proved in the affirmative. They are noted below, like all my other measurements, in vulgar fractions of an English inch, and include, for the sake of comparison, measurements made at the same time of the red blood-corpuscles of a few other osseous fishes. Only the average sizes are given; and the long diameters are denoted by L. D., and the short diameters by S. D.

	L. D.	S. D.
Salmo fontinalis	$\frac{1}{1455}$	$\frac{1}{2286}$
Salmo salar	$\frac{1}{1524}$	$\frac{1}{2460}$
Salmo fario	$\frac{1}{1524}$	$\frac{1}{2900}$
Salmo ferox	$\frac{1}{1524}$	$\frac{1}{2900}$
Thymallus vulgaris	$\frac{1}{1684}$	$\frac{1}{2900}$
Osmerus eperlanus	$\frac{1}{2286}$	$\frac{1}{3000}$
Clupea harengus	$\frac{1}{2666}$	$\frac{1}{3555}$
Clupea pilchardus	$\frac{1}{2133}$	$\frac{1}{3200}$
Cyprinus cephalus	$\frac{1}{2133}$	$\frac{1}{3555}$
Gadus luscus	$\frac{1}{2460}$	$\frac{1}{3200}$
Platessa flesus	$\frac{1}{2666}$	$\frac{1}{3000}$
Caranx trachurus	$\frac{1}{2000}$	$\frac{1}{3555}$
Trigla hirundo	$\frac{1}{2666}$	$\frac{1}{3555}$
Syngnathus typhle	$\frac{1}{2286}$	$\frac{1}{2666}$
Conger vulgaris	$\frac{1}{2286}$	$\frac{1}{3000}$
Anguilla vulgaris	$\frac{1}{1745}$	$\frac{1}{2842}$
Ammodytes lancea	$\frac{1}{2000}$	$\frac{1}{3555}$

Hence it appears that, among these osseous fishes, the blood-disks of the *Salmonidæ* are the largest; and this fact will appear still wider on a comparison with an extended and revised version of my Tables of Measurements, which is now being prepared for publication. The blood-disks of the Salmons are, indeed, so nearly of the same size as

those of the Sturgeon—a cartilaginous fish—that it would be difficult to distinguish them, and are approached in magnitude by those only of the common fresh-water Eel among the osseous fishes of which I have examined the blood. It is remarkable that in this Eel the corpuscles are larger than in its bigger congener the Conger, and that in the Herring they are smaller than in its near ally the Pilchard; and how nearly the red corpuscles of the river-Eel agree in size with those of the Sturgeon may be seen by my figures in the 'Proceedings of the Zoological Society,' 1862, already cited. Were the red blood-corpuscle of the Salmon duly placed as regards size, it would be between the like corpuscles of *Anguilla* and *Sturio* in that engraving. The further increase in the magnitude of the red corpuscles of the Plagiostomes has been well known from Hewson's discovery, a century since, of this fact in the Rays, to the recent extension of observations in the same order of fishes by Rudolph Wagner. In *Lepidosiren*, as I have long since shown, the blood-disks are so much larger as to present rather a batrachian than piscine character.

As regards the class of fishes, we are much in want of further observations; for the corpuscles have yet been examined in only a limited number of species and families. And the inquiry is especially difficult in osseous fishes, since their red corpuscles are much prone to very rapid changes both in size and form, and require great care in the preparation. Their size varies too, still more than in the hot-blooded vertebrates and scaly Reptiles, in the same species and in the same individual of that species. In the Appendix, p. 3, of the English version of Gerber's 'General and Minute Anatomy,' 8vo, Lond., 1842, I have noticed such facts in Mammalia and Birds, and Dr. Bowerbank's observations to the same effect in man. While in certain members of *Acanthopteri* and other ichthyic orders the blood-disks are like in their oval shape to the typical ones of Birds, there are Fishes among the *Anacanthini*, *Lophobranchii*, &c. in which the majority of the blood-disks are suboval, with some of every intermediate form to a regular circle, and all this in one species or a single individual. Besides, the red corpuscles often present many (crescentic, fusiform, bent, angular, and other) figures, which may be due to changes after death, as such forms prevail in the blood of the *Gadidæ*, &c. obtained from inland fishmongers, but not in that taken with due care from living species of the same fish. Still in the live fish some of these forms may be seen, anon assuming the regular figure, in the red corpuscles circulating within the blood-vessels.

Thus far concerning the irregularities in size and shape. And as to the regular figures and average sizes of the red blood-corpuscles, they are shown by the annexed woodcut in four species, each



belonging to a different order:—1. *Salmo salar*; 2. *Caranx trachurus*; 3. *Platessa flesus*; 4. *Syngnathus typhle*. They are all drawn to a scale of which each division is equivalent to $\frac{1}{1000}$th of an English inch, like all my other engravings of similar objects.

It was made known by Hewson that there is no relation between the size of the species and the size of its red blood-corpuscles in members of different orders of Mammalia; and my measurements show that these corpuscles are as large in the tiny Harvest-Mouse and Mole as in the big Horse and Giraffe. But about a quarter of a century ago those measurements (Appendix to Gerber's 'Anatomy, pp. 4 and 26, and Notes XCVIII. and CXVIII.* to Hewson's Works) proved that there is such a relation throughout the class of Birds, and in single orders or families of Mammalia; that is to say, in the class of Birds and in orders or families of Mammalia the smallest blood-disks occur in the small species, and the largest blood-disks in the large species of that class and those orders or families. In fine, throughout the class of Birds there is as much uniformity in the red blood-corpuscles as in some single orders of Mammalia, Reptiles, and Fishes; the short diameter of those constantly oval corpuscles of Birds has a general agreement with the diameter of the circular corpuscles of Mammalia; and the relation, as above explained in the highest two classes of vertebrates, has not yet been found in the lowest two classes, though the smaller size of the red blood-corpuscles in the little Smelt than in the larger species of the Salmonidæ is remarkable. And, as shown in my old Tables of Measurements, some exceptions there are to one or other of the foregoing rules, but those rules generally remain unaffected by subsequent researches. Indeed the relations of size of the red corpuscles of the blood in the different classes of vertebrates, especially as regards respiration and animal heat, are not without significance; and this will become more obvious and interesting as soon as our knowledge is extended of the gradations of size and quantity of those corpuscles in relation to the organization and economy of the species, concerning which some important points have been discussed in the first volume of the "Leçons sur la Physiologie et l'Anatomie Comparée," by Milne-Edwards.

For an opportunity of examining the blood of living specimens of *Salmo fontinalis* and *Salmo ferox* I have had the advantage, through the courtesy of Mr. Frank Buckland, of the thriving fish in his interesting museum of economic pisciculture at South Kensington.

5. Note on the Black Snake of Robben Island, South Africa†. By Dr. Albert Günther, F.R.S., F.Z.S.

[Received October 7, 1872.]

The majority of herpetological collections possess, among the

† [This Snake was presented to the Society the 24th of September last, by Mr. G. H. Bramwell Fisk. Robben Island lies in Table Bay, about 7 miles off Cape Town.—P. L. S.]

numerous variations of colour of *Coronella cana*, specimens of a uniform deep-black colour. These specimens are of large size, from 3 to 5 feet in length. On the occasion of naming such an example, recently received by the Zoological Society from Robben Island, about 5 feet long, and now living in the Gardens, I reexamined two similar specimens in the British Museum, and was surprised to find that they agreed with one another, and differed from the other brown or blackish varieties, in having the scales in thirty-one rows, the latter possessing only twenty-seven or twenty-nine series of scales. It would appear that Levaillant also observed the same variety in Robben Island (Schleg. Phys. Serp. ii. p. 157*). The locality where the examples in the British Museum were obtained is not known; they, together with a young one, were presented many years ago by the Royal College of Surgeons. The young is spotted as in other varieties, but has also thirty-one series of scales.

It seems to me that this variation deserves to be distinguished by a specific name, because two characters (insignificant by themselves) coincide in a form which appears to be localized in Robben Island. I propose to designate it by the name of *Coronella phocarum*.

6. A List of the Species of *Cassididæ* found on the Coast of New South Wales, together with Remarks on their Habitats and Distribution. By J. Brazier, C.M.Z.S., M.R.S.N.S.W.

[Received July 15, 1872.]

1. Semicassis saburon.

Cassis saburon, Adanson, Voy. en Sénégal, pl. vii. fig. 8; Lam. Anim. sans Vert. tome vii. p. 227; Reeve, Conch. Icon. pl. v. fig. 11 *a*, *b*.

Cassis pila, Reeve, Conch. Icon. pl. ix. fig. 21.

Cassidea saburon, Bruguière.

Buccinum saburon, Dillwyn.

Hab. Near the mouths of the Macleay, Nambucca, Bellengen and Redbank rivers, north of Port Jackson. Found also at New Caledonia by Monsieur Perroquin; on the coast of Spain, at Gijon, by Mr. McAndrew; Cadiz, by Monsieur Paz; and at Minorca by Monsieur Cardona. The shell described by Reeve under the name of *C. pila* appears to me to be only a variety of *C. saburon*.

2. Semicassis (Phalium) areola.

Buccinum areola, Linnæus.

Cassis areola, Lam. Anim. sans Vert. tome vii. p. 222.

Cassidea areola, Bruguière.

Cassis areola, Reeve, Conch. Icon. pl. ix. fig. 24.

Hab. Broken Bay, Port Stephens, Port Macquarie; and near the

* I am unable to find the reference given by Schlegel in Levaillant's second voyage.

mouths of the Macleay, Nambuccra, Bellengen, Redbank, and Clarence rivers. This species is also found at New Caledonia and the Philippine Islands.

3. Semicassis (Phalium) coronulata.

Cassis coronulata, Sowerby, Tankerville Catalogue, App. p. 20; Reeve, Conch. Icon. pl. xii. fig. 31.

Hab. Broken Bay; and near the mouths of the Macleay, Bellengen, and Redbank rivers.

This species is very often mistaken for *C. glauca*, Linn., which is a very common shell, but not found on the Australian coast.

4. Semicassis (Casmaria) paucirugis.

Cassis paucirugis, Menke, Moll. Novæ Hollandiæ, p. 23, sp. 107; Reeve, Conch. Icon. pl. viii. fig. 19 *a*, *b*.

Hab. Merimbula, south of Port Jackson; Encounter and Guichen Bays, South Australia; Swan River, Western Australia; it also ranges to Tasmania.

5. Semicassis (Casmaria) achatina.

Cassis achatina, Lam. Anim. sans Vert. tome vii. p. 226; Reeve, Conch. Icon. pl. x. fig. 28 *a*, *b*.

Hab. Merimbula, Wollongong, and Botany Bay, south of Port Jackson; thrown on shore after gales. "Bottle and Glass" rocks, Port Jackson; found under stones. Also north of Port Jackson at Broken Bay; Port Stephens; Port Macquarie; near the mouths of the Macleay, Nambuccra, Bellengen, Redbank, and Clarence rivers.

6. Semicassis (Casmaria) pyrum.

Cassis pyrum, Lam. Anim. sans Vert. tome vii. p. 226; Reeve, Conch. Icon. pl. xi. fig. 29 *a*, *b*, *c*.

Cassis zeylanica, Lam.

Hab. Botany Bay, Merimbula, Hunter's Bay and Middle Harbour, Port Jackson; Broken Bay, Port Stephens, Port Macquarie; near the mouths of the Macleay, Nambuccra, Bellengen, Redbank, and Clarence rivers. It is also found in Tasmania, and on the west coast of New Zealand.

7. Semicassis (Casmaria) torquata.

Cassis torquata, Reeve, Conch. Icon. pl. i. fig. 1 *a*, *b*.

Hab. Near the mouth of the Macleay river, New South Wales. I obtained one fine example of this species when investigating that part of the coast two years ago.

8. Semicassis (Casmaria) sophiæ.

Cassis sophiæ, Brazier, Proc. Zool. Soc. 1872, p. 617.

Hab. Near Grassy Head (*coll. Brazier*).

This beautiful shell is, so far as I know, unique in my cabinet.

7. List of Species of *Mitridæ* collected at Rarotonga, Cook's Islands, with Notes, also Descriptions of new Species. By Andrew Garrett, of Tahiti.

[Received August 12, 1872.]

1. Mitra episcopalis, D'Argen.

This species occurs abundantly at all the Polynesian islands, and is invariably found on sand or sandy mud in shallow water.

2. Mitra pontificalis, Lam.

This has as wide a range as the preceding, but is much more rare, and occurs under clumps of coral on reefs.

The animal is uniform creamy-white, with opaque white dots.

3. Mitra adusta, Mart.

This species, like the two above, is found at all the Polynesian groups, but is comparatively rare, except at the Viti Isles, where we obtained it in abundance from under stones in shallow water.

4. Mitra ferruginea, Lam.

Also occurs at all the South-Sea islands, and lives under stones on reefs. We only found it plentiful at Tahiti and the Paumotu Islands.

The animal is cinereous, or pale yellow, slightly varied with reddish brown.

5. Mitra cardinalis, Gron.

Has a very wide range, and delights in sandy mud, especially on a stony bottom. It is not by any means abundant. Our finest examples were obtained in shallow water at Tahiti.

The animal is uniform creamy-white.

6. Mitra fulva, Swains.

This species is not uncommon, and has a very wide range. It is found under clumps of coral on reefs.

The animal is chestnut-brown, with a paler siphon, and white creeping-disk.

7. Mitra casta, Lam.

A very rare Polynesian *Mitra*, found in sandy mud at low-water mark. We only met with it at Rarotonga and Tahiti.

8. Mitra nivea, Swains.

This fine species is very rare. We obtained a single mutilated example at Rarotonga, and four more or less perfect ones at Anaa, one of the Paumotu Islands.

9. Mitra pellis-serpentis, Rve.

Is also rarely found, and seems to be confined to the Paumotu, Tahiti, and Cook's groups.

10. Mitra abbatis, Chem.

Only a few dead examples of this rare *Mitra* were found at Tahiti and at Rarotonga.

11. Mitra testacea, Swains.

This is also a rare Polynesian *Mitra*, and only occurred in a dead condition at Tahiti, Rarotonga, Paumotu, and the Kingsmill Islands.

12. Mitra columbellæformis, Kien.

This fine species occurs under stones on reefs, and was found at the Paumotu, Tahiti, Cook's, and Kingsmill Islands.

13. Mitra dermestina, Lam.

Is found at all the Polynesian islands, though not by any means common. It is met with under stones on reefs.

14. Mitra speciosa, Rve.

This beautiful species is very rarely found. All we obtained were from Rarotonga, Paumotu, and Swain's Island, and were in a dead condition.

15. Mitra literata, Lam.

A common species at all the Polynesian islands, and occurs on rocky ground in the upper region of the littoral zone.

16. Mitra acuminata, Swains.

Under stones on reefs. Ranges all through the South Seas, but only abundant at the Paumotu and Kingsmill groups.

The animal is uniform pale yellow.

17. Mitra maculosa, Rve.

We obtained a few examples of this species at most of the South-Sea islands. They were found on reefs. Our finest specimens are from Cook's group.

The animal is deep chocolate-brown, the creeping-disk, tentacles, and siphon clear white.

18. Mitra nodosa, Swains.

Common to all the Polynesian islands, but by no means abundant. On reefs. Our finest specimens are from Rarotonga. The coloured variety figured by Reeve was not met with by us at any of the South-Sea groups.

19. Mitra tuberosa, Rve.

Occurs at all the South-Sea islands, but only found abundantly at the Viti and Cook's Islands. On reefs.

20. Mitra brumalis, Rve.

This has the same range as the preceding, but is more rare. On reefs.

The animal is uniform pale yellow.

21. Mitra multicostata, Swains.

This pretty species only occurred at Rarotonga, where we obtained it on the reefs.

22. Mitra coronata, Chem.

A rare species, of which a single dead example was picked up on the beach. We also obtained it at the Sandwich, Kingsmill, Viti- and Samoa Islands.

23. Mitra micans, Rve.

Only a single, but perfect specimen was found on the reefs. We never noticed it at any other locality.

24. Mitra crocata, Lam.

Besides Rarotonga, we can mention the Samoa and Viti Islands as localities for this rare *Mitra*. Found in a dead condition on reefs.

25. Mitra amabilis, Rve.

Somewhat rare, and ranges from the Paumotu to the Viti Islands. On reefs.

26. Mitra cucumerina, Lam.

A common species at most of the South-Sea islands, and found on reefs.

The animal is diluted white, dotted with creamy yellow.

27. Mitra consanguinea, Rve.

A rare species, of which several dead examples were gathered on the reefs. It is equally rare at the Samoa and Viti Islands.

28. Mitra aurora, Dohrn.

If we have rightly determined this fine *Mitra*, we can add to the localities Rarotonga and the Paumotu Islands. Dohrn's examples were obtained at the Sandwich Islands.

29. Mitra assimilis, n. sp.

Shell oblong, subfusiform, turreted, solid, shining, whitish, with closely set transverse deep-brown slightly raised lines; spire moderately elevated, acute; whorls 8–9, plano-convex, shouldered above, longitudinally ribbed, ribs closely set, angular, slightly nodulous, 16 to 18 in number; body-whorl convexly rounded, contracted and granulated at the base; aperture narrow, bluish white and lyrate within; outer lip rather sharp and crenulate; columella with four folds.

Length 16 mill., diam. 8 mill.

Hab. Rarotonga, Samoa, and Viti Islands (*coll. Garrett*).

A very rare species, found under stones on reefs. It belongs to the same group as *M. concinna*, *crocata*, and *flavescens*.

30. MITRA FRATERCULA, n. sp.

Shell oblong, subfusiform, solid, shining, contracted at the base; spire moderately elevated, acute, brownish-yellow, transversely lineated with deep brown, and adorned with a spiral white band; whorls 8–9, plano-convex, slightly shouldered, longitudinally ribbed, ribs small, closely set, angular, 16 to 18 in number, slightly nodulose above, and the interstices remotely transversely impressedly striated; body-whorl large, roundly convex, granulated towards the base; aperture narrow, little less than half the length of the shell, bluish white and lyrate within; columella with four folds.

Length 19 mill., diam. 8 mill.

Hab. Tahiti, Rarotonga, Samoa, and Viti Islands (*coll. Garrett*).

The animal is light brown, dotted and mottled with yellowish white.

A very rare species, found under stones on reefs, and belongs to the same group as the preceding.

31. MITRA LUTEO-FUSCA, n. sp.

Shell oblong-ovate, subfusiform, solid, smooth, polished, shining, yellowish brown, with large whitish spots; spire moderate, acute, half the length of the shell; whorls 9, convex, the upper ones cancellated with fine longitudinal ribs and transverse impressed lines; body-whorl slightly ventricose, rapidly tapering, and obliquely striated at the base; aperture oblong, bluish white and lyrate within; outer lip thickened above; columella with five strong folds.

Length 16 mill., diam. $6\frac{1}{2}$ mill.

Hab. Rarotonga, Cook's Islands (*coll. Garrett*).

A very rare species, of which we obtained two examples from the reefs.

32. MITRA EXQUISITA, n. sp.

Shell small, oblong, subfusiform, glassy, hyaline, pinkish red, with two transverse brown lines enclosing a white band, the band and one line continued up the spire; spire rather short, turreted, subacute, little more than half the length of the shell; whorls 9 (3 of which are embryonal), plano-convex, shouldered above, the last rounded, much contracted and granulated at the base, which is produced in a short slightly twisted canal; longitudinally ribbed, ribs closely set, rather large, angular, slightly nodulose above, 12 to 13 in number, interstices transversely impressedly striated; aperture narrow; outer lip rather thin, notched above, and slightly sinuous; columella with four folds.

Length 5 mill., diam. $3\frac{1}{2}$ mill.

Hab. Paumotu, Tahiti, Cook's, Samoa, and Viti Islands (*coll. Garrett*). It belongs to the same group as *M. recurva* and *mirifica*. Notwithstanding its wide range, it is a rare species. Under stones on reefs.

32. MITRA ZEBRINA, n. s.

Shell oblong-ovate, subfusiform, solid, ventricose, attenuated at

the base, smooth, shining, bluish white, with longitudinal flexuous brown stripes; spire rather short, concavely conical, subacute, half the length of the shell; whorls 8–9, slightly convex, finely crenulate and shouldered above, the upper ones decussated with fine longitudinal ribs and transverse impressed striæ, the latter continued on the lower whorls, and becoming obsolete on the middle of the body; aperture narrow, bluish white and lyrate within; outer lip rather thin, sinuous; columella with five folds.

Length 16 mill., diam. 8 mill.

Hab. Paumotu, Tahiti, Cook's, Samoa, and Viti Islands (*coll. Garrett*).

A very rare species, found under stones on reefs.

33. Cylindra nucea, Gron.

A comparatively rare species, found in sandy mud between tide-marks, and occurs at all the Polynesian islands.

The animal is diluted white, the foot and siphon margined and mottled with black and white.

34. Dibaphus edentulus, Swains.

A rare species, found under stones on reefs, and ranges from the Paumotu to the Viti Islands.

Owing to the animal of this shell being unknown, it has been provisionally placed in the family *Conidæ*. While exploring the Samoa and Viti Islands, we were fortunate in discovering several living examples, and, after a careful study of the animal, could not detect any difference between it and a *Cylindra*. Unfortunately the notes and drawings made at the time were subsequently lost in a shipwreck. On plunging a living example in alcohol, the spirit became much discoloured, of a fine purple, the same as when any other *Mitridæ* are placed in spirits. Its proper place in a natural classification will be between *Cylindra* and *Imbricaria*.

35. Imbricaria conica, Schum.

A very abundant species, gregarious on shallow sand flats, and ranging from the Paumotu to the Viti Islands. We did not find a single example north of the equator.

36. Imbricaria punctata, Swains.

A somewhat rare species, having the same range as the preceding, and found in the same station.

The animal is diluted white, with pale brown tentacles. The foot is large, oblong, thin, rounded behind, and truncate in front. The head and tentacles are small, the latter bearing the eyes on basal enlargements.

37. Imbricaria virgo, Swains.

We obtained examples of this species at most of the Polynesian islands. It is not abundant, and, like all the species, delights in sand or sandy mud flats.

8. Further Observations on the Swallows of Buenos Ayres. By W. H. Hudson, C.M.Z.S.

[Received August 6th, 1872.]

I have already spoken in former communications * of all but one of the species of Hirundinidæ that visit us in this region; the bird I have yet to describe is the *Atticora cyanoleuca*—the *Golondrinas timoneles negros* of Azara, and the smallest of our Swallows. I cannot say what are the limits of its range, as my wanderings have not extended far in any direction, and I have never yet been in any region where it is not well known. In Buenos Ayres these Swallows appear early in September, coming before the three species of *Progne* that visit us, but preceded by the *Hirundo leucorrhoa*. They are bank-birds, breeding in forsaken holes and burrows (for they never bore into the earth themselves), and are consequently not much seen about the habitations of man. They sometimes find their breeding-holes in the banks of streams, or in peopled districts in the sides of ditches, and down in wells. But if in such sites alone fit receptacles for their eggs were found, the species, instead of one of the commonest, would be rare indeed; for on the level pampas most of the watercourses have marshy borders, or at the most but low and gently sloping banks. But the burrowing habits of two other animals, the Vizcacha (*Lagostomus trichodactylus*) and the Minera (*Geositta cunicularia*) have every where afforded the Swallows abundance of breeding-places on the plains, even where there are no streams or any other irregularities in the smooth surface of earth.

The *Geositta* bores its hole in the sides of the Vizcacha's burrows; and in this burrow within a burrow the swallow lays its eggs and rears its young, and is the guest of the Vizcacha and as much dependent on him as the Wren or the Swallow we call domestic is on man; so that in spring when this species returns it is in the villages of the Vizcacha we see them. There they live and spend the day, sporting about the burrows, just as the domestic Swallow does about our houses. The nest, constructed of dry grass lined with feathers, is placed at the extreme end of the burrow, and contains five or six white, pointed eggs. After the young have flown, they sit close together on a weed, thistle-top, or low tree; and the parents continue to feed them many days.

As in size and brightness of plumage, so in language also is this Swallow inferior to his congeners, his only song consisting of a single weak, trilling note, much prolonged, which the bird repeats with great frequency when on the wing. But sometimes he utters two notes; and then the second note, though much the same, is longer and more inflected than the first; yet his voice has ever a mournful monotonous sound. If a rapacious bird or a Fox chances to intrude upon the burrows when they are breeding, these Swallows summon each other with cries indicative of fear and anxiety; but even then

* See P. Z. S. 1871, p. 326, and 1872, p. 605.

these cries are neither loud nor shrill. When flying, these Swallows glide along very close to the earth, and when weary settle down (contrary to the custom of other Swallows) and rest on the level grassy plains. Like other birds of this family they possess the habit of gliding to and fro before a rider's horse to snatch up the little twilight moths startled from the grass. Seldom does a person ride on the pampas in summer without having a number of Swallows gather round him; often I have thought that more than a hundred were before my horse at one time; but, from the rapidity of their motions, it is impossible to count them. I have also noticed individuals of the four most common species of Swallow following me together; but after sunset, and when the other species have long forsaken the grass plains for the shelter of trees and houses, this diminutive Swallow continues to keep the traveller company. At such a time, as they glide about in the dusk of evening conversing together in low tremulous tones, they have a peculiarly sorrowful appearance, seeming like homeless little wanderers over the great level plains.

When the season of migration approaches, they begin to congregate in parties not very large (though sometimes as many as one or two hundred individuals are seen together); these companies spend much of their time perched close together on weeds, low trees, fences, or other slightly elevated situations, and pay very little attention to a person approaching, but seem preoccupied or preyed upon by some anxiety that has no visible cause.

This time immediately preceding the departure of the Swallows is indeed a season of deep interest to the observer of nature. The birds seem to forget their songs and aerial recreations; the attachment of the sexes, the remembrance of the spring is obliterated; they already begin to feel the premonitions of that marvellous instinct that urges them hence: not yet an irresistible impulse, it is a vague sense of disquiet; but its influence is manifest in their language and gestures, their wild manner of flight, and listless intervals. The little *Atticora cyanoleuca* disappears immediately after the other, larger species. Many stragglers continue to be seen after the departure of the main body; but before the middle of March not one remains, the migration of this species being very regular.

I give a few more remarks on other species of Swallows, and I shall have done with this family. I continue to meet so frequently with single birds and small parties of the *Hirundo leucorrhoa*, even on the coldest days of winter, that I am quite positive the birds of this species breeding as far north as Buenos Ayres city migrate in an exceedingly irregular manner, many remaining with us all the year, and that the further south we go we find their migrations become more strict and definite; for in Patagonia from March to August I saw not one of them. The same may be said of some other migratory species in this region.

This fall I noticed, as usual, large numbers of the Swallow of which I spoke in my former remarks as closely resembling the *H. leucorrhoa*, but with chestnut tinges*. When they began to pass they flew

* See P. Z. S. 1871, p. 328.

in their usual loose uncertain fashion, straggling here and there to hawk for insects as they journeyed. But late in April, after almost all the other passage birds had ceased from passing, these continued to appear; the weather was already cold; and all these late comers flew with great celerity and as directly north as if their flight had been guided by the magnetic needle.

I know yet nothing of this bird except from seeing them pass in autumn; and it seems strange to me that they should pass over Buenos Ayres flying north, unless they come straight from the Falklands, and so cross in their passage over six hundred miles of ocean.

In February I watched the Swallows passing with much interest in hopes of seeing flights of the Patagonian *Progne purpurea*, but was disappointed; probably they pass considerably to the west of Buenos Ayres. But late in summer I had observed an individual of this species associating with the Common Swallow, *P. chalybea*, which it so much resembles; and as I have seen these birds here before, I think it likely that a few pairs remain to breed as far north as this district.

9. Notes on *Propithecus*, *Indris*, and other Lemurs (*Lemurina*) in the British Museum. By Dr. J. E. Gray, F.R.S. &c.

[Received October 11, 1872.]

(Plates LXIX.–LXXI.)

Propithecus.

For many years a single species only of *Propithecus* was known, the *Propithecus diadema* of Bennett. Lately several specimens have been received from Madagascar which differ in colour from the species described by Mr. Bennett; and each set of specimens possessing a different colour has been described as a distinct species, to which often more than one name has been applied.

In the 'Catalogue of Monkeys and Lemurs in the British Museum' (pp. 90 and 136), I noticed the three species which the Museum then possessed, observing "they are so much alike that I should not be astonished if all the three named species were varieties of colour of the same animal. We have skulls of *Propithecus diadema* and *P. damonis* in the British Museum, and they are very much alike." Since that time the British Museum has received another variety of colour which I indicated as *P. bicolor* in the Annals and Magazine of Natural History for 1872, vol. x. p. 206, but which we are now informed* had been previously named *P. edwardsii* by M. A. Grandidier (Compt. Rend. 1871, lxxii. p. 231); and I should be particularly sorry to deprive my friend Prof. Edwards of the honour thus conferred upon him. I have also had the opportunity of examining several specimens of the three other presumed species, and also of comparing the skulls of *P. bicolor* and *P. edwardsii* with the other

* See Ann. & Mag. N. H. 1872, vol. x. p. 298.



C. Percy del. et lith. Mintern Bros. imp.

PROSIMIA RUFIPES. 1 ♂ 2 ♀

BRITISH MUSEUM
280673

P. Z. S. 1872. LXX.



C. Bergeon del. et lith. Mintern Bros. imp.

OPOLEMUS MILII ♂ & ♀.

BRITISH MUSEUM
280C73



C. Bergeau del et lith. Mintern Bros. imp.

CHEIROGALEUS TYPICUS. ♂ & ♀.

BRITISH
28.c.73
MUSEUM

skulls, and I am now more convinced than I was formerly that what had been considered species are merely variations, or breeds, of the same species, which seems to be a very variable one; at least I have not been able to find any organic character by which they can be separated, either in the colour or external organization, or in the skull.

The varieties may be thus divided (and there are specimens of the first five in the British Museum) :—

1. *edwardsii*. Black or blackish, the hinder part of the upper part of the body whitish or yellowish. *P. edwardsii*, Grandidier; *P. bicolor*, Gray.
2. *diadema*. Grey; hands, top of head, shoulders and upper part of the back black or blackish; limbs yellowish; circumference of face white. *P. diadema*, Bennett.
3. *damonis*. White; chest and outer side of the fore and hind limbs rusty red. *P. damonis*, Pollen; *P. coquerellii*, M.-Edwards.
4. *verreauxii*. White; crown and nape brownish black. *P. verreauxii*, Grandidier.
5. *coronatus*. White; circumference of face black; chest reddish. *P. coronatus*.
6. *deckenii*. White, with a small black spot on the back of the neck. *P. deckenii*, Peters, Monatsb. 1870; *P. diadema*, Peters, V. d. Deck. Reis. Ost-Afric. t. i. *

Thus we see that the colour of the five gradually passes from black to nearly pure white; and I should not be surprised to receive black specimens without any white, and white specimens without any black. The naked or nakedish part of the skin, seen through the hair, in all the specimens which I have seen is black; but in several of the more or less white specimens preserved on the Continent, so much white substance is used in the preparation, that the skin appears nearly white; the white, however, comes off. I suspect that that must be the case with the specimen (*P. deckenii*) figured by Dr. Peters.

The fur on the underpart of the body and the inner side of the limbs is very sparse.

There is in the British Museum a skull of *Propithecus diadema*, and also of *P. edwardsii*, *P. coronatus*, and *P. damonis*. These skulls vary considerably in size and in the shape of the auricular bullæ. That of *P. edwardsii* is the largest; and next to it, but rather smaller, is *P. diadema*; *P. damonis* is about the same size, but more conical; *P. coronatus* is rather smaller, with a slightly angular ridge behind. In *P. edwardsii* the forehead between the eyes and rather behind is convex, and the brain-case appears somewhat more ventricose. In *P. diadema* the forehead is flat or very slightly concave. In *P. damonis* and *P. coronatus* the forehead is concave on each side, with a convexity in the middle. In *P. coronatus* the nose is much broader and more swollen than in the other three species or varieties; but the nose of this skull appears to have

* The British Museum has since received a specimen with greyish black instead of white on the forehead (Ann. & Mag. N. H. 1872, x. p. 474).

a disease of the bone. This is probably from the animal having died in confinement. There is only a single skull of each of these species or varieties in the British Museum; and the differences appear to be individual rather than specific; probably the one with the broad nose is a male and the rest are females, or the converse.

Indris.

The Indri (*Indris brevicaudatus*), like the *Propithecus*, appears to vary a great deal in the amount of white with which the general black colour of the animal is variegated. The British Museum has received a specimen of the animal which has been described as a species by Dr. Peters (Monatsb. 1871, p. 360) under the name *Lichenotus mitratus*, brought by Mr. Crossley from Sera Lalaw. It is peculiar for having, in addition to the white rump of the other species, a white ruff round the neck and on the back of the head; and the outer side of the fore and hind legs and the sides of the body are more distinctly white than in the common Indri. I have compared the skull with that of the common black *Indris brevicaudatus*, and can find no difference, any more than I can any organic difference in any other part of the specimens; I believe that, like the white specimen called *Simpouné* (*Indris albus*, Vinson, Compt. Rend. iv. p. 829), it is only an accidental variety. These black *Indrisina* appear to be peculiarly liable to become variegated with white, or even to become entirely white, or with a very small amount of black only*.

I propose to replace the table of the genera of Lemuridæ, which have six cutting-teeth in the lower jaw, and six grinders on each side of each jaw, given in the appendix at the end of the 'Catalogue of Monkeys and Lemurs in the British Museum' (1870, p. 131), by the following. I may state that there is a mistake in that table caused by leaving out a line.

Table of Genera.

I. *Intermaxillaries very small, truncated in front. Cutting-teeth none, or two, one behind the other, at the base of the canines. Ears moderate, hairy.* Lepilemurina.

1. Lepilemur. Upper cutting-teeth none. Ears moderate.
2. Hapalemur. Upper cutting-teeth 2–2. Nose narrow in front.
3. Prolemur. Upper cutting-teeth 2–2. Nose broad, truncated in front.

II. *Intermaxillaries prominent and arched in front. Upper cutting-teeth in a curved series, the two middle usually longer and larger than the others and converging towards the central line.*

A. The ears moderate, covered externally with fur, the tail long.

* The British Museum has since received a specimen with a white patch over each eyebrow, the fore legs nearly to the hands, the hinder part of the thigh, the legs from the knee to the ankle, and the whole underside iron-grey. (*I. varicgatus*. Ann. & Mag. N. H. 1872, x. p. 474.)

Brain-case oval, nose rather produced, once and a half as long as the diameter of the moderate orbits. The upper cutting-teeth on the outer part of the sides of the prominent intermaxillaries. LEMURINA.

4. LEMUR. Wrist with a narrow bald line and pad above. Tail with black rings.
5. PROSIMIA. Wrist entirely hairy. Tail not ringed. Head without a ruff.
6. VARECIA. Wrist entirely hairy. Head with a ruff. Eyebrows and skull very prominent.

B. The ears short, rounded, covered externally with close appressed hair, and naked on the edge. Tail cylindrical or conical. The cutting-teeth on the middle of the sides of the prominent intermaxillaries, with a moderate central space; the middle generally the largest. CHEIROGALEINA.

* Brain-case oval. Nose contracted in front of the orbit, scarcely narrower in front.

7. OPOLEMUR. Tail thick, tapering towards the end, and covered with rather longer hair at tip. (Fig. 1, p. 854.)

** Brain-case subglobular. Nose broad, tapering in front, a little longer than the diameter of the orbit.

8. PHANER. Inner upper cutting-teeth very large, projecting upwards and forwards. Tail with soft diverging hair.
9. CHEIROGALEUS. Inner upper cutting-teeth moderate. Tail with woolly hair. (Figs. 2 & 3, pp. 855, 856.)

*** Brain-case subglobular. Nose broad, tapering in front, shorter than the diameter of the large orbits.

10. MIRZA. Inner upper cutting-teeth moderate, converging. Tail with straight rigid hair.
11. AZEMA. Inner upper cutting-teeth nearly equal, erect. Tail with soft hair. (Fig. 4, p. 856.)
12. MURILEMUR. Inner upper cutting-teeth twice as long and large as the outer, which are very small. Tail with short soft hair.

C. The ears very large, naked, plicate. Tail hairy, often bushy. The brain-case globular, thin. Nose tapering in front. Upper cutting-teeth equal, cylindrical. GALAGONINA.

† The upper cutting-teeth strong, in an arched line, shelving and near together in front.

13. SCIUROCHEIRUS. Intermaxillaries thickened and convex above on the upper part of the upperside. (Fig. 5, p. 858.)

†† The upper cutting-teeth very slender, in a nearly straight line, close to the canines, erect, leaving a large central space.

14. HEMIGALAGO. Intermaxillary bone large and produced above on the underside of the nose-hole, convex below.
15. OTOLICNUS. Intermaxillary bone moderate, nearly erect above. (Fig. 6, p. 859.)

**** Brain-case ovate, solid. Nose not narrowed in front. Upper cutting-teeth quite close to the inner side of the canines, leaving a broad central space, erect, equal. Intermaxillary bone simple, thin.

16. EUOTICUS. Skull short and broad. Face short, two-thirds as long as the diameter of the very large orbits.
17. OTOGALE. Skull ovate. Face rather elongate, as long as the diameter of the moderate sized-orbits.

Or the last section, C, may be divided thus:—

* *The nose conically elongate beyond the upper lip; skull thin, globular; intermaxillary high and convex in front above.*

13. SCIUROCHEIRUS. Tail bushy. Upper cutting-teeth in an arched line.
14. HEMIGALAGO. Tail slender. Upper cutting-teeth very slender, nearly in a straight line, close to the canines.

** *Nose truncate, simple, not produced beyond the upper lip; intermaxillary not thickened in front; upper cutting-teeth close to the canines.*

15. OTOLICNUS. Skull globular, thin. Upper cutting-teeth small.
16. EUOTICUS. Skull ovate, solid. Face two thirds the diameter of the orbit.
17. OTOGALE. Skull ovate, solid. Face as long as the diameter of the orbit.

More detailed characters of the new genera are given in the 'Catalogue of Monkeys and Lemurs in the British Museum,' and therefore are not repeated here.

Tribe 1. LEPILEMURINA.

1. LEPILEMUR, Gray, Cat. Monkeys & Lemurs, 1870, p. 134.

The skull of this genus is figured in Pollen's 'Fauna Madagascar.' t.7.f.3. M. Adolphe Milne-Edwards says that there are cutting-teeth in the upper jaw when the animal is young; but I do not know on what authority. They must be very small, as the intermaxillary bone is so slender.

LEPILEMUR PALLIDICAUDA.

Fur pale grey; chin, inner side of limbs and underside of body whitish. Shoulders and outer side of the fore legs brownish-washed, the tail uniform pale brownish or reddish white-grey, like the back at the upperside of the base, which extends the furthest down the tail in the female.

"*Cheirogaleus major* ♀," Frank (from Mus. Leyden?).

? *Lepilemur ruficaudatus*, Grandidier, Rev. et Mag. Zool. 1867, p. 256. Frank (from Mus. Leyden).

Hab. Madagascar (*Berarding*, 1871).

There are two skulls of this animal in the British Museum. They

are very much alike in measurement; but the nose of one looks much thicker and more rounded above than that of the other. The one with the broadest nose has rather more ventricose auricular bullæ. They are said to be the skulls of male and female: the one with the narrower nose is said to be the female; and this difference may be only one of sex. The intermaxillary bones are very small, thin, and weak. The front of the upper jaw without any teeth, and the bone so thin that there is not room to hold any. Nose rather produced, rounded above, and about the length of the diameter of the orbits. The nose is rather conical. Ears ovate, exposed and covered externally with close, short, appressed hairs. Tail elongate, cylindrical, rather wider at the end, and covered with softer hair, which is rather longer on the end than on the other part. The skulls of the three species are exceedingly alike in size and form, as figured by Pollen, Faun. Madag. t. 7. f. 3.

The fur of *Lepilemur mustelinus* and *L. dorsalis* is redder. The tail of *L. mustelinus* is of the same colour as the back to the end; in *L. dorsalis* the tail is like the back for two thirds of its length, and black at the end. Altogether *L. mustelinus* is most like *L. major* in the uniform colour of the tail, but is entirely without indication of a dorsal streak; indeed I should not be at all surprised if all the three should prove to be varieties of the same species, though so different in colour.

The specimens of *Lepilemur dorsalis* in the British Museum are said to be of the two sexes; but the differences do not depend on sex.

This animal was sent to me by Mr. Frank, of Amsterdam, as *Lepilemur ruficaudatus*, Grandidier, Rev. & Mag. Zool. 1867, p. 256, which is only thus briefly noticed,—"Cinereus, rufescens, capite nigrescente, artubus posterioribus pallide cinereis. Cauda rufa. Jugulo fulvescente abdomineque albido. Long. tot. 56″, corp. 31″, caud. 25″."

I think that it can scarcely be the case, as the head is not blackish, and not nearly so dark as the head of either *L. mustelinus* or *L. dorsalis*.

2. HAPALEMUR, Gray, P. Z. S. 1870, p. 827; Cat. Monk. & Lem. 1870, p. 133.

The teeth and lower jaw of this species are figured by Mr. Mivart, P. Z. S. 1864, p. 613. (Copied, Gray, Cat. Monkeys &c. p. 77).

HAPALEMUR GRISEUS, Gray, Cat. Monkeys &c. p. 76, & p. 133. Madagascar.

3. PROLEMUR, Gray, P. Z. S. 1870, p. 828; Cat. Monkeys &c. pp. 131–133.

The skull of this genus is figured in the P. Z. S. 1870, p. 829. f. 1 & 2, p. 830. f. 3 & 4; and by Pollen, Fauna Madagasc. t. 7. f. 2, where the skull has lost its upper cutting-teeth.

PROLEMUR SIMUS, Gray, P. Z. S. 1870, p. 828, f. 52; Cat. Monkeys &c. p. 133.

Hapalemur griseus, Schlegel & Pollen, Faun. Madag. p. 6, t. 3 (skull).

It has been suggested that the colour of *H. griseus* and *P. simus* are so alike that they are only the sexes of the same species; but this is a point that can only be determined by a naturalist who can observe them in the wild state, and unfortunately it is to the pecuniary interest of the persons who collect animals for sale to make species as numerous as they can.

Tribe 2. Lemurina.

The cutting-teeth on the sides of the intermaxillary with a very wide space in the middle between them.

4. Lemur, Gray, Cat. Monkeys &c. 1870, p. 72.

In the 'Catalogue of Monkeys' the teeth of this genus are figured from Huxley.

Lemur catta, Gray, Cat. Monkeys &c. p. 72.

5. Prosimia, Gray, Cat. Monkeys &c. p. 73.

The skull of *Prosimia albifrons*, figured by Blainv. (Ostéogr. t. vii.) and Van der Hoeven (Nat. Tijdsch. p. 11, t. i. f. 2).

There seems to be considerable difference of the colour between the sexes of the species of this genus, and almost as much difference in the opinion of the keepers of the menageries as to what are the differences.

Thus Cuvier considered *Prosimia anjuanensis* the female of *P. albifrons*; but Mr. W. MacLeay (Linn. Trans. xiii. p. 624) says that both sexes of this species have a white forehead. Dr. Sclater (P. Z. S. 1871, p. 231, t. 16) figures *P. collaris* as the male and *P. nigrifrons* as the female of the same species; and, curiously enough, Mr. Bennett, in the 'Gardens and Menageries of the Zool. Soc.' i. p. 31, says that both *P. nigrifrons* in the Society's menageries were females.

I strongly suspect the real fact is that the specimens in confinement frequently have promiscuous intercourse, and that the result is that a number of hybrids render their distinction more difficult, which perhaps explains the existence of some of the doubtful species.

Fortunately we are now obtaining some wild specimens of this genus.

Prosimia rufipes. (Plate LXIX.)

Fur woolly, thick, dark rufous brown, with a golden gloss from the tips of the hairs, the sides of the head and cheeks, the hand and arm, and the feet and the sides to the under part of the body bright bay. Tail nearly black, rather longer than the head and body.

Male with the middle of the throat greyish, face with short blackish hair.

Female similar above, but with the chin, throat, and underpart of the body reddish grey, the face and edge of the under jaw covered with blackish hairs.

Prosimia rufipes, Gray, Ann. & Mag. N. Hist. 1871, vii. p. 339.
Hab. Madagascar (Mr. Crossley), B.M.

This species is interesting, as the specimens of the two sexes are said to have been collected in a wild state.

These animals are so mild and tractable that they are said to be often kept in a seminaturalized state by the inhabitants; therefore one is never sure that the specimens one receives from collectors and dealers are not animals so kept and breeding together under unnatural circumstances.

6. Varecia, Gray, P. Z. S., 1863, p. 135; Cat. Monkeys &c. pp. 70 & 132.

The skull is figured, Gray, P. Z. S. 1863, p. 135; Cat. Monkeys &c. p. 71. f. 1.

Blainv. Ostéogr. *Lemur*, t. iii. (skull), t. xi. (teeth).

Here again there is great difficulty in the distinction of species. Dr. Schlegel considers *Lemur macaco* (*Lemur niger*, Geoffroy) a male, and regards *Lemur leucomystax*, Bartl. P. Z. S. 1862, p. 347, pl. xli., as the female of the same species, which is curious, as *L. niger* has been known for more than a hundred years, and *L. leucomystax* has been brought to England only within the last few years. I once thought that *Lemur niger*, *Lemur varius*, which is black and white, and *Lemur ruber* were distinct species, *L. varius* having the head, feet, shoulders, and tail always black, *L. ruber* having the head, the underside of the feet, and tail black, the body (including the shoulders) dark-red, reddish white, or pure white, and all intermediate shades. The examination, however, of the series of specimens brought home by Mr. Crossley and those in the Museum induced me to believe that they are all one species, extremely variable in colour, some being black, others red, and others white, and all the intermediate shades and variations. (See Ann. & Mag. Nat. Hist. 1870, vii. p. 339.) Mr. Bartlett, on the contrary, thinks that the *Lemur varius* and *Lemur niger* differ in their voices, and that there is in the Zoological Society a female of *Lemur varius* nearly coloured like the males, whilst the sexes of *Lemur niger* are quite unlike one another. (See P. Z. S. 1871, p. 430.)

This last observation of Mr. Bartlett's, if correct, throws great doubt on the idea that *V. niger* and *V. leucocephalus* are the male and female of the same species; for it would be very curious and against all analogy that two species so nearly allied should differ in the essential particular of one species having the two sexes nearly alike, and the other so very differently coloured. I do not recollect any similar fact occurring among the Mammalia which have come under my observation.

Tribe 3. Cheirogaleina.

The pairs of upper cutting-teeth on the middle of the sides of the prominent intermaxillary bones, with a moderate space in front.

7. Opolemur.

The ears moderate, exposed, rounded, and covered with close appressed hair on the outer side. The tail conical, thick at the

base, gradually tapering to the end, covered with close fur like the rest of the body, the hair becoming rather longer at the tip. Brain-case ovate, globular. Nose rather shorter than the diameter of the orbit, suddenly contracted before the orbit, and only slightly wider behind than before. The upper cutting-teeth four, two in front longer and broader than the small cylindrical outer pair. Front pair dilated at the end, and obliquely truncated. Front upper grinder elongated, with a compressed, elongate, triangular crown.

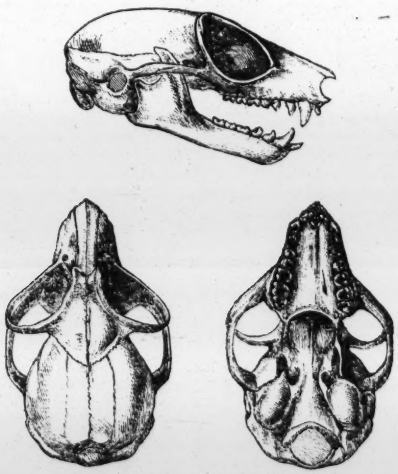
Skull: Blainv. Ostéogr. *Lemur*, t. vii.

The skull differs from those of *Cheirogaleus typicus*, *Azema smithii*, *Murilemur murinus*, and *Mirza coquerellii*, all of which are broad near the orbit, and gradually become narrower in front, forming a more or less distinct conical nose; whereas this skull suddenly contracts in front of the orbit, and is nearly as broad in front as behind. The two front upper cutting-teeth are larger and longer than the outer ones, and rather dilated at the end.

OPOLEMUR MILII. (Plate LXX.)

Dark grey-brown, minutely punctulated with white; the circum-

Fig. 1.



Opolemur milii, nat. size.

ference of the orbits and side of nose black; chin, cheeks, and underside whitish.

Maki nain, F. Cuv. Mammif. 1821.

Cheirogaleus milii, Geoffroy, 1828; Gray, P. Z. S. 1863; Cat. Monkeys &c. p. 77.

Lemur milii, Blainv. Ostéogr. *Lemur*, t. vii. (skull ♂).

Hab. Madagascar, Morondava.

The British Museum has received a pair of this animal, named *C. milii*, from Mr. Frank, who probably had them from the Leyden Museum.

The tail is thick at the base, and gradually becomes thinner to, and more cylindrical towards the end. The ears are small, rounded, and covered with close short hair externally. The tail of one specimen is blackish at the end. The whole specimen is blacker than the other, which is redder, with a pale tip to the tail.

8. PHANER, Gray, Cat. Monkeys &c. p. 135.

Blainville, Ostéogr. t. 7; skull figured by Schlegel and Pollen, Faun. Madag. t. 7. f. 1; as *Microcebus furcifer* by Mivart, P. Z. S. 1864, p. 621, Gray, *l. c.* p. 642, copied Cat. Monkeys &c. p. 89, f. 15.

PHANER FURCIFER, Gray, Cat. Monkeys &c. p. 135.

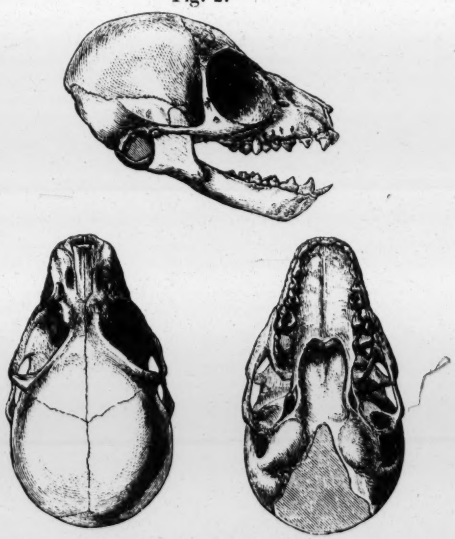
Lepilemur furcifer, Gray, *l. c.* p. 88.

9. CHEIROGALEUS, Gray, Cat. Monkeys &c. pp. 77, 131.

Skull (figs. 2 & 3, young and old).

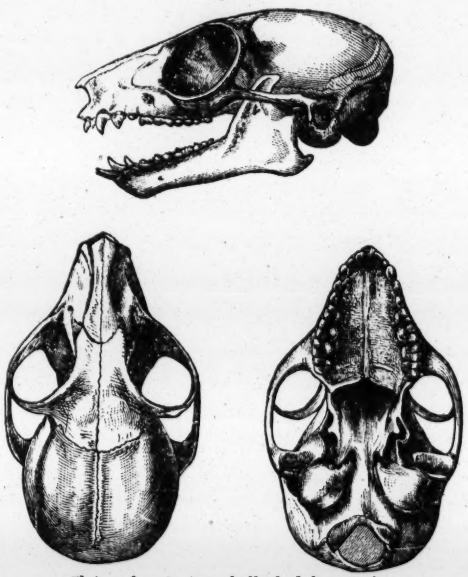
CHEIROGALEUS TYPICUS, Gray, Cat. Monkeys &c. pp. 78, 133. (Plate LXXI.)

Fig. 2.



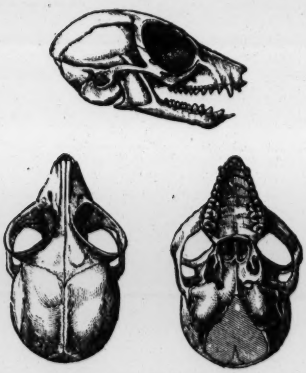
Cheirogaleus typicus, very young ♂.

Fig. 3.



Cheirogaleus typicus, skull of adult, nat. size.

Fig. 4.



Azema smithii ♀, rather larger than natural size.

10. Mirza, Gray, Cat. Monkeys &c. p. 135.

Skull figured by Schlegel and Pollen, Faun. Madag. t. 7. f. 2.

Mirza coquerellii, Gray, Cat. Monkeys, &c. p. 136.

Microcebus coquerellii, Schlegel and Pollen, Fauna Madag. p. 12, t. 6, 7. f. 2, skull.

11. Azema, Gray, Cat. Monkeys &c. pp. 132, 134.

Skull (fig. 4, p. 856).

Azema smithii, Gray, Cat. Monkeys &c. pp. 132, 134.

Cheirogaleus smithii, Gray, *l. c.* p. 78.

12. Murilemur, Gray, Cat. Monkeys &c. p. 135.

Skull figured by Blainv. Ostéogr. *Lemur*, t. xi.; Mivart, P. Z. S. 1864, p. 615; copied (*Lepilemur murinus*) Gray, Cat. Monkeys &c. p. 87. figs. 13–14.

Murilemur murinus, Gray, Cat. Monkeys &c. p. 135.

Lepilemur murinus, Gray, Cat. Monkeys &c. p. 87.
Lemur murinus, Blainv. Ostéogr. *Lemur*, t. xii. (skull).

Tribe 4. Galagonina.

The noses in several of the genera are like those of the other Lemurs, truncated at the end just above the upper lip. In *Sciurocheirus* and *Hemigalago* the nose is conical and produced, and raised from the edge of the upper lip. In these animals the intermaxillaries are thick and enlarged above, and have a convex prominence in front of the upper part, whilst in the other genera the intermaxillary bone is simple and flat on the front edge.

13. Sciurocheirus.

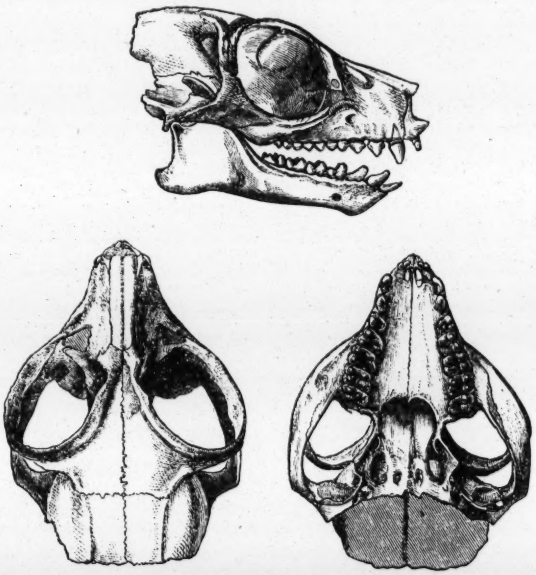
Nose rather conical, produced beyond the upper lip; two thirds the length of the very large orbits. Tail thick, with spreading hair. Skull short and broad. The cutting-teeth strong, in two pairs, some distance from the canines, in a strongly arched line, equal, and directed towards the centre line. Intermaxillaries produced in front of the nose-cavity, convex externally below. Fingers and toes very slender, elongate.

Galago, Gray, Cat. Monkeys &c. p. 82.

Sciurocheirus allenii. (Fig. 5, p. 858.)

Galago allenii, Gray, *l. c.* p. 82 (not figure of the teeth).
Hab. Fernando Po.

Fig. 5.



Sciurocheirus allenii, nat. size.

14. HEMIGALAGO.

Nose rather conical, produced beyond the upper lip. Tail slender, cylindrical. Skull thin; brain-case round. Nose conical, about two thirds the length of the very large orbits. Cutting-teeth of the upper jaw small and thin, erect, equal, in a very slightly arched line, quite close to the inner edge of the canines, and leaving a large space in the centre. The intermaxillaries large, produced in front of the nose-cavity, convex externally below.

Skull, Gray, Cat. Monkeys, &c. fig. 12.

Hemigalago, Dahlbom.

Galago ***, Gray, Cat. Monkeys &c. p. 86.

HEMIGALAGO DEMIDOFFII, Dahlb. Stud. t. 10.

Galago demidoffii, Gray, Cat. Monkeys &c. p. 86, f. 12 (skull).

The peculiarity of the intermaxillary bone (which is not so well represented in the figure quoted as it ought to be) shows an affinity of this genus to *Loris*, in which this bone and the nose are more produced, and also to *Sciurocheirus*, in which it is not so much produced.

15. Otolicnus.

Nose truncated, on a level with the upper lip. Tail bushy. Brain-case round. Nose conical, about two thirds the length of the large orbits. Cutting-teeth of the upper jaw small, thin, erect, equal, in a very slightly arched line, quite close to the front of the inner edge of the canines, leaving a broad space in the centre. The intermaxillaries moderate, nearly erect.

Skulls, Gray, Cat. Monkeys &c. p. 83, figs. 10 & 11.

Otolicnus senegalensis.

Galago senegalensis, Gray, Cat. Monk. p. 84.
Hab. West Africa.

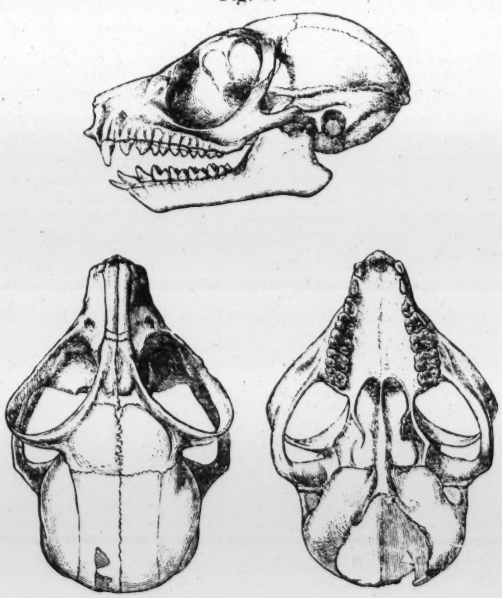
Otolicnus sennariensis.

Galago sennariensis, Gray, Cat. Monk. p. 84, f. 10.
Hab. Sennaar.

Otolicnus maholi.

Galago maholi, Gray, Cat. Monk. p. 83.
Hab. S. Africa.

Fig. 6.



Otolicnus gabonensis, nat. size.

OTOLICNUS GABONENSIS. (Fig. 6, skull.)

Galago allenii gabonensis, Gray, Cat. p. 82, f. 8 (teeth).

Galago (*Otolicnus*) *gabonensis*, Mivart, P. Z. S. 1864, p. 647. teeth.

Hab. Gaboon.

16. EUOTICUS.

Otogale ** *euoticus*, Gray, Cat. Monkeys &c. p. 81.

Nose truncate in front. Tail with long hair. Skull very like *Otogale*, but with the nose much shorter and the orbits much larger. Skull, P. Z. S. 1863, p. 140; Cat. Monk. p. 82, f. 7.

EUOTICUS PALLIDUS.

Otogale (*Euoticus*) *pallida*, Gray, P. Z. S. 1863, p. 140, t. 10; Cat. Monk. p. 81, fig. 7 (skull).

Hab. Fernando Po.

17. OTOGALE, Gray, P. Z. S. 1863, p. 139; Cat. Monkeys &c. p. 78.

Nose truncate. Tail with long hair. Upper cutting-teeth nearly equal, large.

Skulls of two species figured, Gray, Cat. Monk. pp. 80, 81, 82. Blainv. Ostéogr. *Lemur*, t. vii. (skull), *L. crassicaudatus*.

* *Upper cutting-teeth in a nearly straight cross line.*

GALAGO CRASSICAUDATUS, Gray, Cat. Monk. p. 80; Blainv Ost. *Lemur*, t. vii. (skull).

Hab. East and West Africa.

** *Upper cutting-teeth in a slightly arched cross line.*

GALAGO GARNETTII, Gray, Cat. Monk. p. 79, fig. 4 (skull).

Hab. Port Natal.

GALAGO MONTEIRI, Gray, Cat. Monk. p. 80, fig. 5 (skull).

Hab. West Africa.

December 3, 1872.

The Viscount Walden, F.R.S., President, in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the months of October and November 1872:—

The total number of registered additions to the Society's Menagerie during the month of October 1872 was 60, of which 7 were by birth, 19 by presentation, 12 by purchase, 14 by exchange, and 8 were received on deposit. The total number of departures during the same period by death and removals was 130.



J.G.Keulemans. Lith.

M & N Hanhart imp.

1. CHOLOPUS HOFFMANNI. 2. C. DIDACTYLUS.

The most noticeable additions during the month of October were as follows:—

1. A Two-toed Sloth from Panama, purchased October 1st. On September 29th, 1869, we obtained a specimen of the same animal, which I referred somewhat doubtfully to *Cholopus hoffmanni*, Peters (see P. Z. S. 1869, p. 602). I am now able to state positively that the Two-toed Sloth of Panama is *Ch. hoffmanni*, having had an opportunity of examining the skeleton of the latter individual, which died on the 24th of December 1870, and of ascertaining that the cervical vertebræ are only six in number, as is always the case in this species.

As Hoffmann's Sloth is little known, the drawing now exhibited (Plate LXXII. fig. 1), in which the singular green colour of the head and nape is well shown, will be of interest. The second figure (Pl. LXXII. fig. 2) represents an example of the Common Two-toed Sloth (*Cholopus didactylus*) now living in the Gardens. It was presented to us January 11, 1871, by Capt. J. G. Hamlyn, and was stated to have been brought from Demerara.

2. An example of a large *Apteryx*, received in exchange October 10th. This bird appears to be really distinct from, although nearly allied to, the *Apteryx mantelli*, differing in its larger size, white bill and claws, and much softer feathers. Mr. Buller tells me this is the large species of the southern island of New Zealand, and should bear the name *australis*; and I must therefore ask leave to recant my lately expressed opinion on this subject (P. Z. S. 1871, p. 496), that *Apteryx australis* was not distinguishable from *A. mantelli*. We have now the following series of these three species of *Apteryx* living in the Society's Gardens:—

(1) *Apteryx australis*. Received in exchange, Oct. 10, 1872.
(2) *A. mantelli*. Presented by A. Lafone, Esq., May 20, 1871.
(3) *A. mantelli*. Purchased, April 14, 1871.
(4) *A. owenni*. Purchased, April 14, 1871.
(5) *A. owenni*. Presented by the Acclimatization Society of Otago, July 28, 1867.
(6) *A. owenni*. Received in exchange, Oct. 10, 1872.

3. A Mortier's Waterhen (*Tribonyx mortieri*, Du Bus), purchased October 21st of Mr. Bills, by whom it was brought from Otago, New Zealand. Mr. Bills states that this bird was certainly captured in the interior of the province—which is an interesting fact, as no such bird had been previously known to occur in New Zealand.

The present specimen exactly resembles that of the same bird previously received by the Society in 1867*, presenting the distinct spots on the wing-coverts whereby *T. mortieri* may be distinguished from its ally, *Tr. gouldi*, Sclater (Ann. N. H. ser. 3, vol. xx. p. 122). It is therefore probable that New Zealand may be the correct habitat of *Tr. mortieri*, and Tasmania that of *Tr. gouldi*.

4. A Schlegel's Civet, *Viverricula schlegeli*, Pollen (Schl. et Pollen, Recherches, pl. x.), from Johannah, Comoro Islands, presented

* See Rev. Cat. Vert. p. 308, and P. Z. S. 1867, p. 816.

October 28th by Mr. C. E. Bewsher, of Mauritius. This species, which we have never previously received alive, appears to be closely allied to *V. indica*.

The total number of registered additions to the Society's Menagerie during November 1872 was 54, of which 2 were by birth, 17 by presentation, 14 by purchase, 10 by exchange, and 11 were received on deposit. The total number of departures during the same period by death and removals was 76.

The most noticeable additions were as follows:—

1. Two Starred Tortoises (*Testudo elegans*, Schœpf) from Ceylon, presented by Mr. W. Vincent Legge, R.E., C.M.Z.S., Nov. 2, 1872.

2. A young male Hippopotamus (*Hippopotamus amphibius*), born November 5th, as already announced*, and now daily increasing in bulk and vigour.

3. A Nippon Ibis (*Ibis nippon*, Temm. Pl. Col. 551), presented by R. Swinhoe, Esq., F.Z.S., H.B.M. Consul at Ningpo, Nov. 9th, 1872.

4. A Chinese Tree-pie (*Dendrocitta sinensis*, Lath.), received from the same donor in company with the above. Both these birds are new to the collection.

5. A Red-fronted Lorikeet, *Chalcopsitta scintillata*, Temm., purchased November 22nd, likewise new to the Society's collection.

6. A Wied's Aracari, *Pteroglossus wiedi*, Sturm, purchased November 23rd, likewise new to the Society's collection.

The Toucans in the Society's Parrot-house now form a beautiful series, illustrating the following species:—*Rhamphastos toco*, *R. vitellinus*, *R. ariel*, *R. carinatus*, and *Pt. wiedi*.

Mr. Sclater exhibited a nest of the Tijereta (*Milvulus tyrannus*)†, containing one egg of that bird and nine of the parasitic *Molothrus bonariensis*, and, having called attention to Mr. W. H. Hudson's previous remarks on this subject (P. Z. S. 1870, p. 548 *et seq.*), read the following communication from the same correspondent respecting this nest and eggs:—

"I send you a nest of the '*Tijereta*,' found last summer on a low thorn tree, and at the extremity of a branch very much exposed to sight. The birds had not forsaken it, but hovered about anxiously when I removed it. I took the eggs out only to blow them, so that you will see the nest with all its contents, just as it was in the tree when I found it. There is in it but one egg of the *Milvulus*, easily known from its pointed shape, pale cream-colour, and chocolate spots; the other eggs are all of the *Molothrus bonariensis*. These eggs were all perfectly fresh; and as there were none that I could find on the ground beneath the nest, I believe that the *Milvulus* had as yet laid only one, and that many more eggs would have been laid

* See *antè*, pp. 795 & 819.

† In my Catalogue of American Birds, I have called the southern form of *Milvulus violentus* (Vieill.), following Bonaparte and Cabanis, but I now consider the southern and northern forms specifically inseparable.

in it by the Blackbirds, though, of course, only to be spoilt or broken. I seldom find a nest containing many Blackbirds' eggs without there being some pecked or broken ones amongst them, so that those still entire are often glued to the nest and to each other by the egg-matter spilt over them; I was therefore all the more glad on finding a specimen so exceptionally clean as this. The eggs in the nest I send differ so much in size and colour that you will perhaps find it difficult to believe them all of one species. I regret very much that when I returned to Buenos Ayres last summer the season was so far advanced that incubation had begun in almost every nest I found; otherwise I would have sent you half a hundred Blackbird's eggs in order to enable you to see how much they vary.

"Besides the Common Blackbird, the only species I positively know to lay sometimes in other birds' nests is the *Molothrus badius*; but its eggs are very easily distinguished from those of *M. bonariensis*. The eggs of the *M. rufo-axillaris* are larger than those of its two congeners, and white without any spots; and I have never yet detected it laying in other birds' nests. I have collected some facts additional to those contained in former letters on the Blackbird, but, as I have sent so much other matter by this mail, will not trouble you with them just at present."

"Buenos Ayres, August 6, 1872."

Mr. H. E. Dresser, F.Z.S., exhibited a large series of skins of Eagles (*Aquila*), and made the following remarks:—

"Mr. W. E. Brooks, of Etawah, forwarded to me some time ago a splendid series of Indian Eagles, and requested me to carefully compare them with our European birds, and to report the result. I have also been intrusted with a large series of Eagles from the collections of Canon Tristram, Lord Walden, Lord Lilford, Mr. J. H. Gurney, and Mr. Howard Saunders, together with those from Mr. Brooks, numbering nearly ninety specimens; and Lord Walden, Mr. J. H. Gurney, and Mr. Blanford have kindly met and carefully examined the series with me, Mr. Gurney and Lord Walden in particular having spent much time in thoroughly investigating the matter. The result at which we have arrived is as follows:—

"*Aquila bifasciata*, Gray, is, we make out, a perfectly distinct and good species, differing in all stages from *Aquila mogilnik*. It never attains a dark blackish brown plumage, nor does it assume the white scapulars. It is at all times of an earth-brown colour, varying in shade according to age. The tail forms also a fair distinctive character, being but indistinctly barred, whereas *Aq. mogilnik* has the tail very strongly marbled with dark brown on a greyish ground to two thirds of its length from the base, the remaining third being dark brown narrowly tipped with light buff. *Aquila bifasciata* appears also to have at all stages the upper tail-coverts more or less white, in one specimen almost pure white; whereas in *Aquila mogilnik* they are dark, tipped with dull buff. In one example the abdomen is distinctly barred, much the same as in *Circaëtus gallicus*, which I am inclined to think is a very adult bird; for were this a

phase of the immature plumage, specimens thus marked would more often be met with.

"The range of this species appears to be restricted to India.

"*Aquila mogilnik*, Gm. (Imperial Eagle.) This species has a very extended range, being found in India and Siberia, and thence extending into Eastern Europe, Asia Minor, and North-east Africa. I have examined specimens from the Danube, Asia Minor, Abyssinia, and a large series from India, and Mr. Gurney has seen examples from China, all of which agree closely. In the immature plumage this Eagle is strongly striated, and in the fully adult livery it has the scapulars alone white, never the shoulder. Otherwise in the adult plumage it does not differ from the Spanish bird, except that the basal portion of the tail is rather lighter in colour.

"*Aquila adalberti*, Brehm. The White-shouldered Imperial Eagle, so far as is at present known, occurs only in Spain and on the opposite side of the Mediterranean, in Morocco, where Major Irby observed it; but I have not yet been able to examine a specimen from there. It is a very distinct species from the Imperial Eagle of Eastern Europe and India, and differs in being light buff in the young plumage, without the characteristic striations in the Eastern bird. From this it moults by degrees into the dark mature plumage, in which it differs from the Eastern species in having the entire shoulder marked with white, whereas in this latter the scapulars alone are white. The German naturalists generally concur in referring *Aq. adalberti* of Brehm* to *Aquila nævioides*, Cuv.; and Lord Walden is of this opinion. Should this prove to be the case this present species has no name, and I would propose to call it *Aquila leucolena*.

"*Aquila orientalis*, Cab., is the name under which the Eastern Spotted Eagle should, according to Mr. Gurney, be known, as Pallas clearly confounded it and *Aquila nævia* in describing his *Aquila clanga*. It is found in Eastern and Southern Europe and Asia Minor. I have examined a large series of specimens in immature and adult plumage from the Volga, the neighbourhood of Smyrna, Palestine, and Greece. Not having had specimens from Siberia, I am unable to state whether it ranges thus far to the east, or whether the Siberian bird is a distinct species.

"The Spotted Eagle of India is distinct from our European *Aq. nævia*, Gm., and will, I take it, stand as *Aquila vittata*, Hodgson. In size it approaches nearer to *Aquila orientalis*, Cab., than to *Aq. nævia*; but, as will be seen from the specimens now exhibited, the adult of *Aq. vittata* is a much darker bird than *Aq. orientalis*.

"*Aquila nævia*, Gmelin. The European Spotted Eagle in the fully adult plumage is not to be distinguished from the adult of *Aquila hastata*, Less., but in the immature plumage differs very widely from the young of that species in the arrangement of the markings, clearly showing that they cannot be referred to the same species. This species is found during the breeding-season in Northern and

* See "Bericht über d. XIII. Versammlung d. Deutsch. orn. Gesellschaft zu Stuttgardt," p. 61.—Ed.

Central Europe, ranging during the winter season down into Northern Africa. To the eastward it is replaced by *Aquila orientalis*.

"*Aquila hastata*, Lesson, is as yet only known from India; and until Messrs. W. E. Brooks and A. Anderson lately sent over the specimens now exhibited it was a bird scarcely known in our European museums; and even now but little is known about its range. The six birds now exhibited are in different stages of plumage, from the peculiarly spotted and striated young dress, in which it widely differs from our *Aquila nævia*, to the fully adult plumage, in which it cannot be distinguished from our European Spotted Eagle. It is the bird figured by Gray and Hardwicke as *Aquila fusca*; and if, as is strongly suspected, the bird described by Lesson as *Morphnus hastatus*, prove not to be this bird, it will have to stand as *Aq. fusca*, Gr. I may mention that Mr. J. H. Gurney is at present carefully investigating this question.

"*Aquila nævioides*, Cuv. (Tawny Eagle), has only quite lately been discovered to inhabit India; and Mr. Brooks has sent over several specimens, two of which I have had the opportunity of examining and comparing with Abyssinian and South-African examples. It is common in Abyssinia and South Africa, and has at least on one occasion been observed and procured in Spain. One of the specimens which I now exhibit is a Spanish bird, from the collection of Lord Lilford. *Aquila fulvescens* of Gray and Hardwicke is the same bird.

"*Aquila vindhiana*, Frankl., is the *Aquila fulvescens* of Jerdon and other Indian authors, and is probably also the *Aquila albicans*, Rüpp. It ranges from India westward into Abyssinia, where it is found together with *Aquila nævioides*, which is the so-called *Aquila fulvescens* figured by Gray and Hardwicke.

"Thus I may briefly summarize the results as follows:—Of Imperial Eagles there are three good species, *Aquila bifasciata*, Gray, *Aq. mogilnik*, Gm., and *Aq. adalberti*, Br.; of Spotted Eagles there are two species in Europe, *Aquila nævia*, Gmelin, and *Aquila orientalis*, Cab., and two, *Aquila vittata*, Hodgs., and *Aquila hastata*, Less., in India; and of Tawny Eagles two, *Aquila vindhiana*, Frankl., and *Aquila nævioides*, Cuv., common to both the east and west, being found in India as well as Africa, and the latter as a straggler to Europe. It will thus be seen that Mr. Brooks is correct in his views as to the distinctness of *Aq. bifasciata* from *Aq. mogilnik*, the latter being called by him *Aq. crassipes* (P. Z. S. 1872, p. 502)—and that he was misled as to the Indian Imperial Eagle not occurring in Europe, only owing to his having compared the Spanish bird with the Indian species."

Professor Owen, F.R.S., read the fourth of a series of memoirs on the osteology of the Marsupialia. The present communication treated of the bones of the trunk and limbs of the Wombats (*Phascolomys*), the skull having been spoken of in a previous paper on the same subject (the third of the series).

This paper will be printed entire in the Society's 'Transactions.'

The following papers were read:—

1. Contributions to the Ornithology of Madagascar.—Part III. By R. Bowdler Sharpe, F.L.S., F.Z.S., &c.

[Received October 14, 1872.]

(Plate LXXIII.)

Mr. Crossley still continues his labours in this island*; and the small collection which forms the subject of the present essay has been, as before, submitted to me by Mr. Cutter, of Great Russell Street, while at the same time I must express my obligations to Mr. C. Ward for allowing me to view and describe the collection in its entirety.

The present consignment comes from the country to the south-east of Antananarivo, which has not been explored before for the purposes of collecting; but unfortunately the inhospitable and barren nature of the country has seriously interfered with Mr. Crossley's arrangements, and the last collection has not proved so productive of novelties as his former ones.

Family Timaliidæ.

Oxylabes madagascariensis. (Plate LXXIII.)

Oxylabes madagascariensis, Sharpe, P. Z. S. 1870, p. 386, et Cat. Afr. B. p. 20.

This species was procured at Voolaly; and Mr. Crossley now sends what I take to be the young bird. This is represented in plate LXXIII. fig. 2. It differs from the adult (fig. 1) in having the crown much paler and more dingy chestnut, the under surface of the body olive-brown, inclining to yellowish along the centre of the breast, while the throat is yellowish instead of white; the upper mandible is dark horn-brown, the lower one yellowish: the white eye-mark is wanting.

Mystacornis crossleyi.

Mystacornis crossleyi, Sharpe, P. Z. S. 1870, p. 392, pl. xxix., et Cat. Afr. B. p. 20.

These birds were procured to the south of the capital, in February 1872. Mr. Crossley has sent over several examples, which show us the gradual change of the young male from the plumage of the old female, by the gradual assumption of the black throat, without a moult.

Family Turdidæ.

Copsychus pica.

Copsychus pica, Pelz.; Hartl. Faun. Madag. p. 38 (1862); Verr. in Vins. Voy. Madag. Ann. B. p. 2 (1865); Schl. P. Z. S. 1866, p. 422; Schl. & Poll. Faun. Madag., Ois. p. 95, pl. 29 (1867); Grand. Rev. Zool. 1867, p. 358.

* See P. Z. S. 1870, p. 384; 1871, p. 313.



Smit. lith. MAN Hanhart imp.

OXYLABES MADAGASCARIENSIS.

BRITISH MUSEUM 280073

The collection contains an adult pair and one immature bird of this species. The young one is somewhat Robin-like in plumage, though generally resembling the old hen bird. It has, however, the upper plumage mottled with rusty, while the under surface is mottled with dull fulvous, the centre of the abdomen being yellowish white, and the thighs entirely white. The gape has the usual yellow flesh peculiar to young birds.

Family Muscicapidæ.

Terpsiphone mutata.

Terpsiphone mutata (L.), Sharpe, P. Z. S. 1870, p. 389.

One specimen shot in March 1872. This bird is in very interesting plumage—as it is gaining the full black back, but still retains traces of its former rufous dress. It is difficult, however, even with a long series before us, to understand these different changes; but it seems pretty clear that, after gaining its rufous plumage and white-marked wing, it moults into its black-and-white dress, which becomes perfected by the assumption of white all over the back and on the tail.

Family Laniidæ.

Xenopirostris polleni.

Vanga polleni, Schl. Faun. Madag. Ois. p. 174; Gray, Hand-l. of B. i. p. 396.

"Kinkimauro, February 1872."

This seems to be an excellent species, distinguished by the glossy blue-black of the throat, which also occupies the entire fore part of the neck, extending to the chest.

Family Paradisiidæ.

Philepitta castanea.

Philepitta castanea (Müll.), Sharpe, P. Z. S. 1870, p. 397, et Cat. Afr. B. p. 54.

The three specimens now sent by Mr. Crossley represent the old male and female of this species, and a young male assuming the black plumage. This appears to be gained by a direct moult, the black feathers, however, retaining a yellow tip, which gradually wears off before the fully black livery is perfected.

Family Caprimulgidæ.

Caprimulgus enarratus.

Caprimulgus enarratus, Gray, Ann. N. H. (4) viii. p. 428 (1871).

The single specimen sent in the present collection differs from the typical one in the British Museum in being everywhere much duller in colour. The collar round the head is buff instead of white; and the tail is deep ferruginous scantily vermiculated and irregularly crossed with narrow black bars. The bird, however, is moulting;

and the new feathers which are appearing in the tail agree with those of the one first described. It is therefore probable that the specimen now sent is a young bird.

Family Cypselidæ.

Cypselus gracilis.

Cypselus gracilis, Sharpe, P. Z. S. 1871, p. 315.

"Chiden-Chiden. February 3, 1872. Iris brown."

The specimen now sent by Mr. Crossley is younger than the typical examples in my collection, and exhibits the remains of obsolete fulvous markings on the feathers of the upper parts, and of rusty margins to the under tail-coverts.

Family Alcedinidæ.

Ispidina madagascariensis.

Ispidina madagascariensis, Sharpe, P. Z. S. 1870, p. 398.

Mr. Crossley sends several specimens of this pretty little Kingfisher, some of which are immature. The young birds, however, seem only to differ from the adults in being paler and more orange in colour, and in having the beak yellowish horn-colour, with the base of the culmen and lower mandible black.

Family Falconidæ.

Accipiter francesi.

Nisus francesii (Smith), Hartl. Faun. Madag. p. 20 (1861); Schl. P. Z. S. 1866, p. 420; Schl. & Poll. Faun. Madag. Ois. p. 36, pl. 14 (1868).

Nisus madagascariensis (Verr.), Hartl. Faun. Madag. p. 20 (1861); Roch and Newton, Ibis, 1862, p. 268; E. Newt. Ibis, 1863, p. 337.

Micronisus madagascariensis, A. Newt. P. Z. S. 1865, p. 833.

Accipiter francesii, Verr. in Vins. Voy. Madag. Ann. B. p. 1 (1865); Grand. Rev. et Mag. de Zool. 1867, p. 320.

Accipiter madagascariensis, Verr. in Vins. Voy. Madag. Ann. B. p. 1 (1865).

One specimen in immature plumage killed in the country to the west of Mananzara in February 1872. The iris is stated to be yellow.

Family Strigidæ.

Scops rutilus.

Scops rutilus, Puch.; Sharpe, P. Z. S. 1870, p. 399.

Scops menadensis, Grand. Rev. et Mag. de Zool. 1867, p. 321.

Two specimens.

Family Rallidæ.

Rallus griseifrons.

Canirallus griseofrons, Gray, Hand-l. of B. iii. p. 67.

Rallina kioloides, Schl. & Poll. Faun. Madag. Ois. p. 135, pl. 39 (1868); Schl. P. Z. S. 1866, p. 425.

BRITISH
MUSEUM
2800 73



FOSSA DAUBENTONII.

Canirallus kioloides, Hartl. Faun. Madag. p. 80 (1861); Verr. in Vins. Voy. Madag. Ann. B. p. 4 (1865).

Porzana kioloides, Grand. Rev. et Mag. de Zool. 1868, p. 4.

One specimen, which Mr. Crossley notes as having a brown iris. Native name "*Vorun boama*." February 1872.

CORETHRURA INSULARIS.

Corethrura insularis, Sharpe, P. Z. S. 1870, p. 400, et P. Z. S. 1871, p. 315.

One specimen from Chepipp, February 1872. Native name *Chemate*.

Family PODICIPIDÆ.

PODICEPS PELZELNI.

Podiceps pelzelni, Hartl. Orn. Madag. p. 83 (1861); Roch & Newt. Ibis, 1863, p. 175; Scl. P. Z. S. 1863, p. 165; Verr. in Vins. Voy. Madag. Ann. B. p. 4 (1865); Grand. Rev. et Mag. de Zool. 1866, p. 6; Schl. & Poll. Faun. Madag. Ois. p. 151, pl. 40.

One specimen.

2. On the Fossane of D'Aubenton (*Fossa d'aubentonii*). By Dr. J. E. GRAY, F.R.S. &c.

[Received October 16, 1872.]

(Plate LXXIV.)

The British Museum has received from Mr. Crossley from Madagascar two specimens of this animal complete and a skeleton. They are very interesting, as showing that they are true *Viverræ* as regards the hairiness of the hinder tarsus; and though they are spotted like the Rasse and the Genets, they differ from them both in having no lunate bands on the throat, in having only spotted tails, and their backs not crested like the Malacca Weazel, *Viverricula*.

A specimen of the Fossane was obtained in Madagascar by M. Poivre, who sent it to the Academy of Sciences at Paris in 1761. It was afterwards sent to the Museum of the Jardin des Plantes, where I have searched for it two or three times when I have been in Paris without being able to discover it; and no zoologist has given a more modern description of it; I fear the original specimen has been lost. I consider the rediscovery of the animal quite as important as the finding of a new species.

Buffon and D'Aubenton gave a very accurate description and figure of M. Poivre's specimen. I was so satisfied, from their description and figure, that it was distinct from all other known *Viverræ* that in the P. Z. S. for 1864, I established a genus for it, under the name of *Fossa*; and this is repeated in the 'Catalogue of Carnivorous, Pachydermatous, and Edentate Mammalia in the British Museum,' p. 62; but Dr. Peters and various zoologists have regarded this as a mistake.

The soles of the feet are entirely covered with hair, as in the true *Viverrinæ*; and therefore it should be placed in that tribe, and not, as I have placed it in the Catalogue, in the tribe *Genettinæ*.

Fossa.

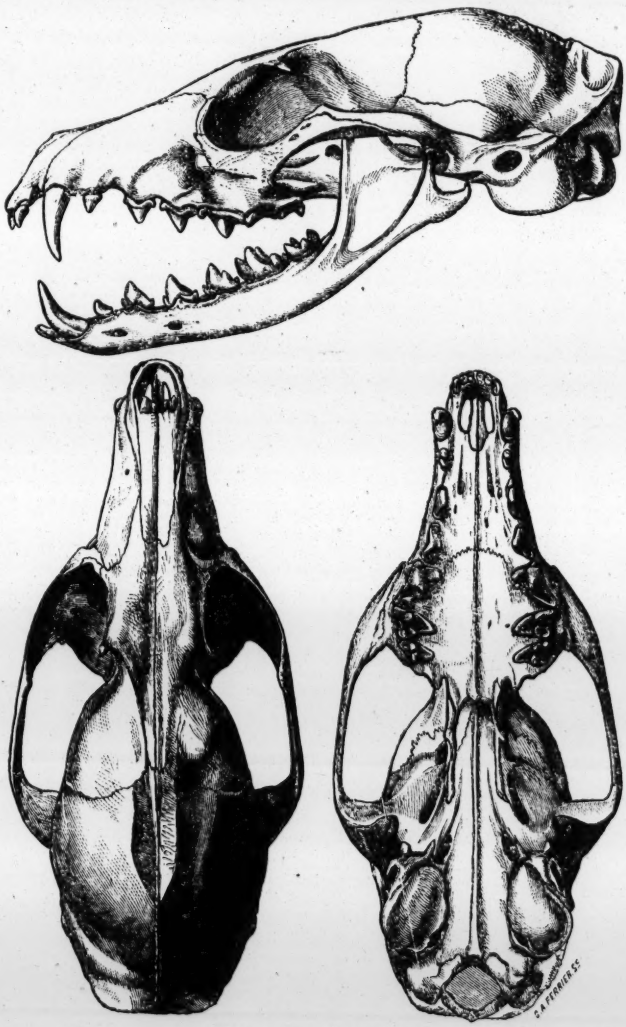
Head long, tapering; muzzle acute. Lower side of the nose with a central furrow. Body elongate, back not crested. Throat pale, without any lunate bands. Back spotted. Tail about as long as the back, covered with uniform hair, subcylindrical, and marked with dark spots on each side of the upper surface, which are closer and give it the appearance of being ringed at the end. Legs equal, slender; the soles of the hind feet covered with uniform short hair. Toes short, webbed at the base; claws 5 . 5, conical, compressed, partly retractile, elevated from the ground and acute.

Skull slender, elongate; brain-case ovate, much contracted in front of the forehead. Forehead flat. Nose elongate, slender, tapering in front, twice as long as the diameter of the orbit, rather convex on the sides over the canines. Orbit very incomplete behind for two thirds of its diameter. Zygomatic arch slender, flattened on the sides. Auditory bullæ vesicular, well developed. Palate very narrow in front, dilated behind. Internal nostrils with a rounded front edge. Lower jaw elongate, slender, regularly arched below; hinder angle produced into an elongate cylindrical lobe, extending beyond the condyle.

Teeth:—Cutting $\frac{6.6}{6.6}$, the upper in a close arched series nearly equal, the hinder on each side being the longest, the lower uniform in an arched series, the outer ones, which are quite close to the canines, the longest. Canines $\frac{2.2}{2.2}$, elongate, cylindrical, gradually tapering, acute, and slightly curved. Grinders $\frac{6.6}{6.6}$, the three front upper compressed, the front simple, subconical, the second and third with a triangular centre and a slight lobe on the front and hind collaret. The fourth or carnivorous tooth triangular, placed obliquely; front edge broad, with a small lobe on the outer and a large conical lobe on the inner side; central lobe most prominent, triangular, hinder end compressed. Fifth and sixth, or tubercular teeth, oblong, angular, transverse, broader than long on the front edge; outer side with two pair of small tubercles, inner side rounded at the end, with a high central conical tubercle.

The cutting-teeth of the lower jaw all compressed; first small, conical, recurved, the second, third, and fourth triangular, erect, with one lobe on the front and two on the hinder edge, which are most distinct in the hinder teeth, the fifth tooth much the largest and broadest, with three large conical tubercles, the outer being the largest, and one smaller tubercle on the outer side of the hinder edge. The sixth or last tooth similar, but much smaller, with three higher tubercles in the front half and two small tubercles behind.

This skull differs from that of the Civets and Genets in being much



Skull of *Fossa d'aubentoni*.

slenderer, in having a shorter and more ventricose brain-case and a much longer and slenderer nose, and also in the tubercular grinders being broader and rounded on the inner side, and in the hinder of the two being larger and more like the penultimate both in size and form. In some respects the skull approaches *Eupleres*; but the nose is broader and not so slender, and small as compared with the brain-case, and the teeth are much more fully developed.

FOSSA D'AUBENTONII. (Plate LXXIV.)

Brown or reddish, closely grizzled with an abundance of white hairs, with four rows of more or less confluent black spots on each side of the back, a few black spots on the hinder thighs. The chin, neck, and belly whitish, more or less obscurely spotted.

Fossane, Buffon, Hist. Nat. viii. 163, f. 21 (good).
Viverra fossa, Schreb. Säugeth. t. 114 (from Buffon).
Genetta fossa, Gray, P. Z. S. 1822.
Fossa d'aubentonii, Gray, P. Z. S. 1864, p. 518; Cat. Carniv. Mam. in B. M. p. 52.
Viverra rasse, var., Peters, Mozambique, p. 113?
Hab. Madagascar, B.M.

There are two perfect specimens in the British Museum, one much darker than the other. In this specimen the rows of spots on the sides of the centre of the back are all united into a narrow black streak, and those of the second row are united in a similar manner on the first half of the back; the underside of the body is yellowish grey without any spots; and the spots or rings of the tail are very obscure. The second specimen has much more distinct and larger spots both on the body and the tail; but only the spots of the back of the neck and shoulders are united on the left side, while the spots of the upper series on the right side are united in lines.

3. On the *Actinemys marmorata* of Mr. Lord, from British Columbia. By Dr. J. E. GRAY, F.R.S. &c.

[Received October 17, 1872.]

Mr. J. K. Lord has presented to the British Museum a young Terrapin, which has been mentioned in his 'Naturalist in British Columbia' as "*Actinemys marmorata*, Agass., the Western Pond-Turtle." He says, "I obtained these Turtles at Walla-walla, in the month of June. They had left the streams, and were wandering about in the grass to deposit their eggs. Apart from the egg-season it is a most difficult matter to catch them. I have seen them in nearly every lake and pool east and west of the Cascades. They are also common on Vancouver Island." (Lord's 'Naturalist in British Columbia,' ii. p. 301.) He gives a reference at the bottom of the page as if it were also mentioned in vol. i., but does not give the page, and I cannot hit upon it. It has no resemblance to the young specimen figured by Professor Agassiz as *Actinemys marmorata* (t. 3. figs. 5–8), and certainly is not the *Emys nigra* figured and

described by Dr. Edward Hallowell in his report on the reptiles discovered in the survey for the railroad-route from the Mississippi river to the Pacific Ocean (1859, p. 3, t. 1), which is supposed to be the adult of *Actinemys marmorata*, and which most probably is the same as *Emys olivacea* (previously described and figured in my 'Catalogue of Shield Reptiles in the British Museum,' 1855, p. 30, t. xii. c), and *Redamia olivacea* (Suppl. Cat. Sh. Rep. 1870, p. 36).

It is very doubtful if the *Actinemys marmorata* and *Emys nigra* are the same animal, as the latter is a true water-Terrapin, and Agassiz arranges *Actinemys* among the more terrestrial *Emydioidæ*. Mr. Lord's specimen is the *Chrysemys orego ensis* figured by Agassiz (t. iii. f. 1–3) on the same plate as *A. marmorata*; but he only gives the following very short description. "The back with numerous yellow lines upon a greenish ground, the sternum with irregular blotches in the form of a lyre all over its surface." He figured it from a specimen in the Smithsonian Institution, "which received its specimens from Port Snelling, Minnesota, in the Yellow-Stone River, Nebraska, and among the Guadeloupe Mountains in Texas;" and he observes that Dr. Holbrook's original specimen, now in the Museum of the Academy of Natural Sciences in Philadelphia, exactly agrees with a living specimen that had been brought from the White-Bear Lake, Minnesota. He has great doubts about the accuracy of the statement that this species had been found in Oregon. (Amer. Testud. part ii. p. 440.) Lord's specimen was received from further north. It is the young of *Emys bellii*, Gray, Syn. Rep. p. 31, and *Chrysemys bellii*, Gray, Cat. Sh. Rep. p. 33, and *Emys speciosa*, Clifft. Cat. Mus. R. Coll. Surg. No. 1525, p. 525. The *Emys oregonensis* of Harlan and Holbrook, and the *Chrysemys oregonensis* of Agassiz, appear to be the same species.

The young Tortoise figured as *Chrysemys belli*, Ag. t. vi. f. 9, may be a variety, but it has a much smaller mark on the sternum.

In my later work I am much inclined to regard these Tortoises as local varieties of *C. picta*, which extends over all parts of North America from the east to the west coast.

As I am not aware that the young of this Western Tortoise has been previously described in detail, I add the following description.

Animal blackish olive. The head, crown olive, with a very narrow central yellow line, and a similar line on each side over the eyebrows. The upper jaw, edge with a distinct yellow line, sides of the head and throat with four black-edged streaks, the upper one curved on the side of the nape, the lower one on the side of the throat. The two lower ones on one side united behind; on the other side they are continued along the side of the neck. The throat with six yellow lines, the two broadest united in front, and forming a line on the middle of the lower beak. The front legs olive, with three continuous white lines in front, extending along the toes to the claws. Outer side of the hinder legs with a yellow marginal band, and a very thin yellow streak on the upper side extending to the toes. Tail elongate, slender, with regular continued yellow lines. Shell broad, oblong, rather depressed, olive-green, the outer margin

with a thin pale yellow line, and slightly revolute on the sides. Nuchal shield broad; nuchal and vertebral shields with a narrow central line along the whole length to the suture between the caudal plates. Vertebral shields hexangular, broader than long, the front the longest and narrowest, each marked with a narrow longitudinal black-edged yellow line in the middle of each side of the shield, terminating before it reaches the hinder margin, and slightly dilated or notched on the front margin. Lateral shields each marked with a subcentral curved black-edged narrow yellow line on the front edge of the rather rough subposterior and subcentral areola, and giving off a black-edged yellow branch from the lower front part to the margin. Marginal plates with a central transverse yellow line, the dark colour on each side of it very obscurely marked with pale curved lines. Lower surface with the marginal scales pale, with a large dark spot on the outer half of the sutures of the plates, which are more or less confluent together, and irregularly shaped on the suture of the hinder plates. Sternum flat, raised on the sides, the sternal costal suture covered with a broad longitudinal black band extending from end to end, and divided into two portions (the upper being much the thinnest) by a longitudinal pale streak; the sternum marked with a nearly symmetrical brown rather irregular-shaped disk, which is varied with streaks and spots, and with large white spots on the sides, which are more or less confluent, giving it a very peculiar appearance.

4. On a new Species of Antelope living in the Society's Menagerie. By Sir Victor Brooke, Bart., F.Z.S.*

[Received October 28, 1872.]

(Plate LXXV.)

In May 1867, Mr. Charles Mosse presented to the Society a small Antelope, which had been brought by him from Gambia. The animal, which is a male, and is still living in the Society's menagerie, was at first believed to be a specimen of *Nanotragus tragulus*, but was subsequently referred to the *Nanotragus montanus* of Rüppell. During the early part of this year, however, I had the opportunity of examining the type specimens of the latter species in the Senckenbergian Museum at Frankfort, and perceived immediately that the little Gambian Steinbock is very decidedly distinct from either of the above-named species. For the sake of convenient reference I will first give short diagnoses of these three closely allied species of *Nanotragus*, and then proceed to describe the Gambian Steinbock more in detail.

1. Nanotragus tragulus (Afz.).

Two well-marked varieties, the one deep rufous, the other silvery

* Since reading this paper I have observed that the Antelope figured in the 'Knowsley Menagerie' (tab. 5) as *Scophophorus montanus* is evidently my *Nanotragus nigricaudatus*.—V. B.



J. Smit, del. M. & N. Hanhart, imp.

NANOTRAGUS NIGRICAUDATUS

BRITISH MUSEUM
2800c73

fawn-colour. Tail of the same colour as the back, of moderate length. Temporal gland, knee-brushes, and false hoofs absent. Ears very long. Horns long and rather slender.

Hab. South Africa.

2. NANOTRAGUS MONTANUS (Rüpp.).

Sandy fawn. Tail of the same colour as the back, and very short, almost rudimentary. Temporal gland and knee-brushes distinct. False hoofs small. Ears moderate. Horns short and subconical.

Hab. Abyssinia.

3. NANOTRAGUS NIGRICAUDATUS, sp. nov. (Plate LXXV.)

Grizzly fawn. Forehead rufous. Tail black, of moderate length. Temporal gland distinct, black. Knee-brushes large. False hoofs present but small. Ears moderate. Horns slender, moderate in length, and slightly bent forward.

Hab. Gambia.

Height at shoulder, 20″; length of ears, $4\frac{1}{4}$″; length of horns, 3″.

A narrow mark about one inch in length on each side of the naked muzzle, a line passing round the eye and suborbital pit, but not meeting in front of the gland, lower lip, chin, spot on throat, belly, inside of limbs nearly as far down as the carpal and tarsal joints, and rump white. Nose and ears externally dusky brown. Forehead and occiput rufous. Temporal gland large, round, and covered with very short bluish black hair, that covering the region between the suborbital pit and the eye being of similar character and colour. Neck, back, flanks, and sides of a peculiar grizzly fawn-colour. This peculiarity is obtained by the base of each hair being almost white, the tip rufous, the intervening part of a deep bluish grey.

In a letter which Mr. Mosse has kindly favoured me with, he writes:—"I procured this Antelope when two or three months old, at Gambia, in March 1867; it was caught near the banks of the river Gambia, about seventy or eighty miles from Bathurst, midway between the latter and Macarthey's Island. I have not seen a similar one since, either there or at any of the stations on the west coast."

5. Note on a hitherto unpublished Drawing in the Buchanan-Hamilton Collection, representing *Barbus beavani*. By Dr. ALBERT GÜNTHER, F.R.S., F.Z.S.

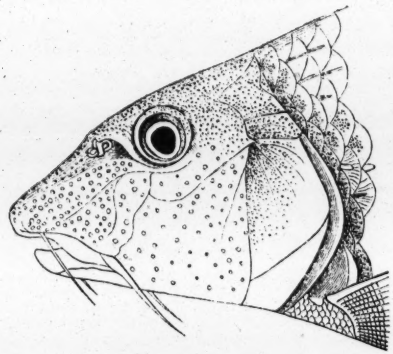
[Received October 29, 1872.]

Through the kindness of Mr. J. Wood-Mason, I have received an "accurate tracing in pencil of the drawing" in the Library of the Asiatic Society of Bengal, bound up with the original drawings of Buchanan Hamilton, and mentioned in the Proceedings of this Society, 1871, p. 764. This drawing had been stated to represent the *Cyprinus chagunio* (B.H.), and to afford the evidence that *Barbus beavani* (m.) was the same fish (P. Z. S. 1871, p. 637).

In order to prove this assertion Mr. Day mentions particularly the length of the barbels, which Hamilton has described as "minute"

in *C. chagunio*. Mr. Day states that in the drawing in the Calcutta Library, "*the rostral barbels are delineated as long as the eye, and the maxillary slightly longer*" (l.c. p. 637). The real state of the matter may be seen in the following woodcut, prepared from a tracing of that drawing:—*the rostral barbels are considerably longer than, and the maxillary twice as long as, the eye.*

Fig. 1.



Head of *Barbus beavani*.

After having corrected this matter of fact, I proceed now to an examination of the question of the relations between *Barbus beavani* and *Cyprinus chagunio*, the examination of which I deferred until I had seen the drawing (l.c. p. 764).

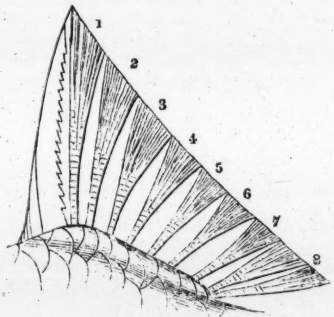
1. I have no doubt that the drawing represents *Barbus beavani*, with which it agrees in every essential point, especially also in the number of the dorsal rays, viz. three undivided and eight divided rays.

2. It is equally certain that it was not intended for the fish described as *Cyprinus chagunio*, for the following reasons:—

a. Hamilton describes the barbels as minute. I will readily admit that he has used this term somewhat vaguely. Generally, barbels described by him as minute are minute, shorter than the eye. *Cyprinus calbasu* (B.H. p. 297, pl. 2, fig. 83) has barbels of about the same length as *B. beavani*; and those he describes as "short," distinguishing between a longer and shorter pair. On the other hand, he describes the barbels of *C. dero* also as minute (p. 278, pl. 22. fig. 78), in which species they are represented as much longer than the eye.

b. *Cyprinus chagunio* is described by Hamilton as having "twelve rays in the fin of the back;" "nine rays are branched, and the last of them is divided to the root." But the drawing represents only eight branched rays, the last being divided (see fig. 2), as is the case in *B. beavani*.

Fig. 2.



Dorsal fin of *Barbus beavani*.

c. It is true that the drawing is labelled "C. chagunio. F. G. p. 295;" but the handwriting is of a very modern character, and certainly not that of Hamilton, with which I am acquainted. Indeed the reference to the "Fishes of the Ganges" must have been added long after Hamilton's return to Europe. Thus this "labelling" proves nothing. Nor is it in M'Clelland's handwriting, who (as may be seen from his 'Indian Cyprinidæ') used to abbreviate the title of Hamilton's work by *P. G.*, and not by *F. G.* Further, M'Clelland, who gives a list of the unpublished figures of *Cyprinidæ* in the Hamilton collection (Ind. Cyprin. pp. 220 and 216, errata), mentions this drawing under the name of *Cyprinus kunta*, referring it as a synonym to *C. sarana* (p. 340). Mr. Day has omitted to state that there is a second name attached to the drawing, evidently of an older date than the first; a portion of the specific name has been cut off in binding the drawings. This name is *Cyprinus Runt*—a name which does not occur in Hamilton's works, but which is evidently the same as *kunta*.

I must take this early opportunity to modify a statement made by me in P. Z. S. 1871, p. 763, to the effect that I had failed to discover in the East-India Museum the types of the Dukkun species described by Colonel Sykes. This is true as regards the majority of these fishes; but at the time I wrote this I had forgotten that in 1864 I believed that I had found two or three of his types. Although not the true names (if any) were attached to the bottles when they were transferred to the Museum, the name of Colonel Sykes was written on the labels, and I still believe the specimens to be typical.

P.S.—Singularly enough, whilst this paper was passing through the press, I discovered, in a miscellaneous collection of fish-drawings made by Dr. Gray and kindly presented by him to me, a lithographic reproduction of the very drawing which forms the subject of this paper. It is marked in print with the words "*Buch. del. J. M. lith.*;" and Dr. Gray has added the following words, evidently

copied from the edges, which were closely cut to reduce the paper to the size of the other drawings: "*Cyprinus sarana, Buchan. Asiat. Research.* xix. t. 41. x." From this we learn that the drawing is undoubtedly one of Buchanan's, that M'Clelland copied it with the intention of publishing it in his "Indian Cyprinidæ" in vol. xix. of the 'Asiatic Researches,' that, for some reason or other, he either cancelled it or inadvertently omitted it; this would partly account for the series of discrepancies between the numbers on the plates and the references in the text, which begin with pl. 41.

I have inserted the tracing sent by Mr. Wood-Mason, as well as the proof of M'Clelland's drawing in the copy of M'Clelland's "Indian Cyprinidæ," belonging to the Library of the Zoological Department of the British Museum, so that they may be consulted by any one who is compelled to investigate the history of this species.

6. Description of a new Species of *Scissurella* from the Paumotu Islands. By Andrew Garrett, of Tahiti.

[Received August 12, 1872.]

Scissurella paumotuensis.

Shell umbilicate, depressedly suborbicular, thin, vitreous, pellucid, white; spire very slightly elevated; whorls $2\frac{1}{2}$, strongly keeled, the last constricted beneath the keel, longitudinally ribbed; ribs small, rather distant, obliquely curved, smaller, more complex and flexuous above, decussated with very fine crisp-like spiral lines; fissure linear, a little back from the margin of the lip; umbilicus large, deep, and somewhat angulated on the margin; aperture subcircular; outer lip very oblique, sharp, entire, and rounded; columella thin and slightly arched.

Height $1\frac{1}{3}$ mill., diam. 2 mill.

Hab. Paumotu Islands.

This is no doubt the first indication of the genus *Scissurella* inhabiting the Polynesian seas. In shape and position the fissure is precisely like that in the genus *Trochotoma*.

7. Descriptions of two new Species of *Separatista*. By Andrew Garrett, of Tahiti.

[Received August 12, 1872.]

Separatista quadricarinata.

Shell small, turbinate, subrhomboidal, obsoletely polygonal, rather thin, pale yellowish horn-colour; spire conical, a little more than half the length of the shell; whorls $5\frac{1}{2}$, prominently angular, the last ventricose, spirally keeled; keels angularly rounded, the lower one encircling the umbilicus, three contiguous ones on the middle of the body-whorl, of which two traverse the lower half of the whorls of the spire; aperture large, semicircular, slightly effuse at the termination of the basal keel; outer lip thin, roundly arched,

vertical, fringed with the ends of the keels; umbilicus deep, in width equal to one fifth the greatest diameter of the shell; columella nearly vertical, slightly arched.

Length 4½ mill., diam. 3 mill.

Hab. Paumotu Islands.

The keels are more prominent than in *S. blainvilleana*, the base more depressed; otherwise it closely resembles that species. The wide space between the basal and three upper keels is concave; and the remote rugosities on the keels give the shell a polyangular appearance.

SEPARATISTA STELLARIS.

Shell small, turbinate, subrhomboidal, thin, horn-colour under a fibrous muddy brown epidermis, which is fringed with distant coarse hairs on the periphery; spire conical, about half the length of the shell; whorls 5 (two of which are embryonal), angulated, the last large, subdiscoidal, with three small transverse keels on the periphery, the upper two traversing the lower half of the whorls of the spire, and two keels on the umbilical region; aperture large, semicircular, wider than long, slightly effuse beneath; outer lip thin, continuous, strongly arched, the epidermis slightly overlapping the margin; columella subvertical and slightly expanded; umbilicus deep, in width equal to one fifth the greatest diameter of the shell.

Length 5 mill., diam. 4½ mill.

Hab. Samoa and Viti Islands.

In this species the body is more depressed, and the keels smaller than in the preceding. Several examples were found attached to a sponge.

8. Descriptions of two new Species of *Cæcum* from the Viti Islands. By ANDREW GARRETT, of Tahiti.

[Received August 12, 1872.]

CÆCUM VITIENSE.

Shell cylindrical, slightly arched, contracted towards the aperture, thin, subpellucid, glossy, light tawny brown, and under the lens closely and finely striated transversely; the aperture, owing to the contraction of that part of the shell, is nearly as small as the decollated apex, and is very oblique.

Length 2½ mill.

A single but perfect example was found at Kioa Island.

CÆCUM COSTULATUM.

Shell cylindrical, slightly arcuated, thin, pellucid, white; surface glossy, with obsolete lines of growth, and the anterior end with several closely set annular ridges; aperture very oblique, not contracted.

Length 3 mill.

Several examples were found on sandy beaches at Kioa Island.

The above two species are probably the only ones described from the South-Sea Islands.

APPENDIX.

LIST OF ADDITIONS TO THE SOCIETY'S MENAGERIE

DURING THE YEAR

1872.

Jan. 3. 1 Tamandua Ant-eater (*Tamandua tetradactyla*). Deposited.
1 Lesser Black-backed Gull (*Larus fuscus*). Presented by Mr. F. H. T. Streatfield, F.Z.S.
2 Great Tits (*Parus major*). Received in exchange.
4 Blue Tits (*Parus cæruleus*). Received in exchange.
1 Imperial Eagle (*Aquila imperialis*). Presented by Joseph Gripper, Esq. Bulgaria.
1 Hippopotamus (*Hippopotamus amphibius*), ♀. Born in the Menagerie.
8. 2 Sloth Bears (*Melursus labiatus*), ♂ and ♀. Presented by the Rajah of Nuzuveed. India.
1 King Penguin (*Apterodytes pennantii*). Presented by F. P. Cobb, Esq. Falkland Isles.
9. 2 Argus Pheasants (*Argus giganteus*), ♂ and ♀. Deposited by J. Fleming, Esq., F.Z.S.
2 Hahn's Macaws (*Ara hahni*). Purchased.
10. 1 Common Kestrel (*Tinnunculus alaudarius*). Presented by C. Whymper, Esq.
11. 1 Chopi Starling (*Aphobus chopi*). Purchased.
2 Violaceous Plantain-cutters (*Musophaga violacea*). Purchased.
1 Common Kestrel (*Tinnunculus alaudarius*). Presented by Mrs. Jones.
12. 1 Greater Sulphur-crested Cockatoo (*Cacatua galerita*). Presented by Miss A. Crump.
1 Senegal Touracou (*Corythaix persa*). Purchased.
2 Guinea Baboons (*Cynocephalus sphinx*). Purchased.
15. 8 Roach (*Leuciscus rutilus*). Presented by Mr. A. Dodd.
17. 1 Blue-bearded Jay (*Cyanocorax cyanopogon*). Purchased.
1 Nose-horned Viper (*Vipera nasicornis*). Purchased.
1 Red-billed Tree-Duck (*Dendrocygna autumnalis*). Purchased.
18. 2 Love-bird Parrakeets (*Agapornis pullaria*). Purchased.
1 Little Grebe (*Podiceps minor*). Purchased.
1 Gold Pheasant (*Thaumalea picta*). Deposited by Mr. J. P. Wilson, F.Z.S.
1 Giraffe (*Camelopardalis giraffa*), ♀. Purchased.

Jan. 19. 1 Russell's Viper (*Vipera russellii*). Presented by Mr. G. Home, M.B. From Darjeeling.
23. 1 Raven (*Corvus corax*). Presented by Mr. C. F. Bailey.
24. 1 Lesser Vasa Parrakeet (*Coracopsis nigra*). Purchased.
4 pairs of Crested Colins (*Eupsychortyx cristatus*). Purchased.
1 Toco Toucan (*Ramphastos toco*). Purchased.
1 Purple-capped Lory (*Lorius domicella*). Purchased.
1 Grey-cheeked Monkey (*Cercocebus albigena*). Purchased.
1 Pluto Monkey (*Cercopithecus pluto*). Purchased.
1 Ludio Monkey (*Cercopithecus ludio*). Purchased.
25. 10 Angulated Tortoises (*Chersina angulata*). Presented by Dr. G. Grey, C.M.Z.S. From Cradock, Cape Colony.
6 Leopard Tortoises (*Testudo pardalis*). Presented by Dr. G. Grey, C.M.Z.S. From Cradock, Cape Colony.
3 Semiserrated Tortoises (*Testudo semiserrata*). Presented by Dr. G. Grey, C.M.Z.S. From the Diamond District, Cape Colony.
4 Areolated Tortoises (*Homopus areolatus*), Presented by Dr. G. Grey, C.M.Z.S. From Cradock, Cape Colony.
26. 1 Hybrid Wolf (between *Canis lupus* and *C. familiaris*). Presented by H.R.H. the Prince of Wales.
1 Collared Fruit-Bat (*Cynonycteris collaris*). Born in the Menagerie.
28. 2 Black-faced Spider Monkeys (*Ateles ater*), ♀. Purchased. From U. S. of Columbia.
1 Spotted Cavy (*Cœlogenys paca*). Purchased. Panama.
1 Agouti (*Dasyprocta*, sp.?). Purchased. Panama.
1 Common Boa (*Boa constrictor*). Purchased. Colon.
2 Red-and-Yellow Maccaws (*Ara chloroptera*). Purchased. Cartagena.
2 Hicotee Terrapins (*Clemmys decussata*). Purchased. Jamaica.
2 Annulated Terrapins (*Clemmys annulata*). Purchased. Colon.
30. 1 Kinkajou (*Cercoleptes caudivolvulus*), ♂. Deposited by the Hon. F. H. North, F.Z.S.
1 African Leopard (*Felis pardus*), ♀. Deposited by F. Van Zeller, Esq.
31. 2 Marsh-Tits (*Parus palustris*), ♂ and ♀. Purchased.

Feb. 1. 1 Red-and-Yellow Macaw (*Ara chloroptera*). Deposited by Lieut. G. Fitz-Gerald.
2. 1 Summer Duck (*Aix sponsa*), ♂. Purchased.
6. 1 Water-Rail (*Rallus aquaticus*). Presented by Lady Mildred Beresford Hope.
1 Common Buzzard (*Buteo vulgaris*). Presented by Mr. Henry P. Underwood.
1 Red-vented Parrot (*Pionus menstruus*). Presented by the Rev. A. W. Booker.
8. 1 Emu (*Dromæus novæ hollandiæ*). Presented by the Rev. G. T. Hudson.
1 Weeper Capuchin (*Cebus capucinus*). Purchased.
1 Six-banded Armadillo (*Dasypus sexcinctus*). Purchased.
1 Sulphury Tyrant (*Pitangus sulphuratus*). Purchased.
1 Sociable Vulture (*Vultur auricularis*). Presented by Mr. C. A. Fairbridge.
2 Black-necked Herons (*Ardea atricollis*). Presented by Capt. Coxwell.

Feb. 9. 1 Greater Spotted Woodpecker (*Picus major*). Purchased.
32 Crested Newts (*Triton cristatus*). Purchased.
16 Smooth Newts (*Triton tæniatus*). Purchased.
13. 2 Black-headed Fruit-Pigeons (*Ptilonopus melanocephalus*). Purchased.
4 Yellow-throated Sparrows (*Passer petronella*). Purchased.
14. 1 Hairy-eared Rhinoceros (*Rhinoceros lasiotis*), ♀. Purchased. From Chittagong.
1 Reddish Monkey (*Macacus rufescens*), ♂. Purchased. East Indies.
1 Lunated Hornbill (*Buceros lunatus*). Purchased.
1 Brown Monkey (*Macacus arctoides*), ♂. Presented by Mr. Oscar Fraser. From Burmah.
1 Brown Monkey (*Macacus arctoides*), ♀. Presented by Lieut. Burne. From Burmah.
1 Brown Monkey (*Macacus arctoides*), ♀. Purchased. From Burmah.
1 Black-fronted Lemur (*Lemur nigrifrons*), ♀. Purchased.
15. 1 Savannah Deer (*Cervus savannarum*), ♀. Purchased.
1 Madagascar Porphyrio (*Porphyrio madagascariensis*). Purchased.
1 Derbian Sternothere (*Sternothærus derbianus*). Purchased.
1 Concentric Terrapin (*Clemmys concentrica*). Purchased.
1 Eroded Cinixys (*Cinixys erosa*). Purchased.
3 African Squirrels (*Sciurus*, sp. ?). Purchased.
1 Bare-eyed Cockatoo (*Cacatua gymnopis*). Purchased.
1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mrs. Farnham.
1 Rhesus-like Monkey (*Macacus rheso-similis*), ♀. Purchased.
1 Tangalung Civet-Cat (*Viverra tangalunga*). Purchased.
1 Golden Tiger-cat (*Felis moormensis*). Purchased.
1 Indian Fruit-Bat (*Pteropus medius*). Purchased.
1 Two-wattled Cassowary (*Casuarius bicarunculatus*). Purchased.
16. 1 Egyptian Trionyx (*Trionyx ægyptiacus*). Purchased.
1 Vulpine Phalanger (*Phalangista vulpina*). Presented by Mrs. Williams.
300 American Charr-ova (*Salmo frontinalis*). Presented by Mr. P. Gilmore.
4 Cardinal Grosbeaks (*Cardinalis virginianus*). Purchased.
2 White-throated Finches (*Zonotrichia albicollis*). Purchased.
1 Red-eyed Ground-Finch (*Pipilo erythrophthalmus*). Purchased.
17. 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Mrs. C. Salvin.
18. 1 Siamese Pheasant (*Euplocamus prælatus*), ♀. Received in exchange.
2 Swinhoe's Pheasants (*Euplocamus swinhoii*), ♂ and ♀. Purchased.
2 White-crested Kaleeges (*Euplocamus albo-cristatus*), ♂ and ♀. Purchased.
19. 1 Quebec Marmot (*Arctomys monax*), ♀. Presented by J. E. Taylor, Esq.
1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Mr. John Hare.
20. 2 Vulpine Phalangers (*Phalangista vulpina*), ♀. Born in the Menagerie.

Feb. 20. 1 Yellow-footed Rock-Kangaroo (*Petrogale xanthopus*). Born in the Menagerie.
1 Blue-fronted Amazon (*Chrysotis æstiva*). Presented by Mrs. Hairby. From Paraguay.
1 Bean-Goose (*Anser segetum*), ♀. Presented by Mr. C. Czarnikow, F.Z.S.
21. 1 Yellow-shouldered Amazon (*Chrysotis ochroptera*). Deposited.
1 Sclater's Curassow (*Crax sclateri*), ♀. Received in exchange.
2 Cuming's Octodons (*Octodon cumingii*). Born in the Menagerie.
1 Pronghorn Antelope (*Antilocapra americana*), ♀. Purchased.
27. 1 Tayra (*Galictis barbara*), ♂. Presented by Mr. F. W. Brown.
1 White-throated Capuchin (*Cebus hypoleucus*), ♂. Purchased.
1 Brown Capuchin (*Cebus fatuellus*), ♀. Purchased.
28. 1 Axis Deer (*Cervus axis*), ♂. Born in the Menagerie.

Mar. 1. 1 Common Otter (*Lutra vulgaris*). Presented by Lord Huntingfield, F.Z.S.
2. 1 Wild Cat (*Felis catus*), ♀. Presented by Mr. Henry F. Fraser.
5. 1 Moustache-Monkey (*Cercopithecus cephus*), ♀. Purchased.
1 Green Monkey (*Cercopithecus callitrichus*), ♀. Presented by Miss E. Gardner.
2 Virginian Colins (*Ortyx virginianus*), ♂ and ♀. Presented by Mr. S. Le Strange, F.Z.S.
1 Pheasant Coucal (*Centropus phasianus*). Purchased.
6. 1 Cocoi Heron (*Ardea cocoi*). Presented by Mr. G. D. Rowley, F.Z.S.
1 Moustache-Monkey (*Cercopithecus cephus*), ♀. Purchased.
1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mrs. T. Egerton.
1 White-eared Fruit-Bat (*Cynopterus marginatus*). Born in the Menagerie.
1 Kusimanse (*Crossarchus obscurus*), ♂. Purchased.
7. 3 Japanese Pheasants (*Phasianus versicolor*), 1 ♂, 2 ♀. Purchased.
1 Sulphur-and-White-breasted Toucan (*Ramphastos vitellinus*). Purchased.
8. 1 Spotted Cavy (*Calogenys paca*), ♂. Presented by Mr. G. Brown.
1 Sacred Ibis (*Geronticus æthiopicus*). Presented by Capt. W. R. Dixon.
9. 2 Pale-headed Parrakeets (*Platycercus pallidiceps*). Received in exchange.
2 Grey Struthideas (*Struthidea cinerea*). Received in exchange.
11. 4 Common Marmosets (*Hapale jacchus*), 3 ♂, 1 ♀. Purchased.
1 Long-snouted Snake (*Passerita myceterizans*). Presented by H. N. Moseley, Esq. From Ceylon.
5 Knob-nosed Lizards (*Lyriocephalus scutatus*). Presented by H. N. Moseley, Esq. From Ceylon.
12. 1 White-whiskered Swine (*Sus leucomystax*). Presented by Mr. H. Gribble. From the Foochoo Islands.
1 Common Kestrel (*Tinnunculus alaudarius*). Presented by Mr. E. Beddingfield.
1 Common Barn-Owl (*Strix flammea*). Presented by Mr. E. Beddingfield.

Mar. 12. 1 Japanese Pheasant (*Phasianus versicolor*), ♀. Deposited by Mr. T. L. M. Cartwright, F.Z.S.

13. 1 White-headed Sea-Eagle (*Haliaëtus leucocephalus*). Presented by Mr. F. M. Corner.

14. 1 Black-eared Marmoset (*Hapale penicillata*). Received in exchange.
1 Merlin (*Hypotriorchis æsalon*). Presented by Dr. A. Günther, F.Z.S.
1 Greater Black-backed Gull (*Larus marinus*). Presented by the Metropolitan Board of Works.
1 Suricate (*Suricata zenik*), ♂. Presented by Mrs. Reid.
1 Suricate (*Suricata zenik*), ♂. Presented by Mr. T. Van Zeller.
1 Green Monkey (*Cercopithecus callitrichus*), ♂. Presented by Mr. T. Brooking Rowe.
1 Green Monkey (*Cercopithecus callitrichus*), ♂. Presented by Miss Bulmer.

16. 1 Blue-fronted Amazon (*Chrysotis æstiva*). Presented by Mrs. Broadman.
2 Guira Cuckoos (*Guira piririgua*). Deposited.

17. 1 Blossom-headed Parrakeet (*Palæornis cyanocephalus*), ♀. Purchased.

18. 1 Mantchurian Deer (*Cervus mantchuricus*), ♂. Presented by Mr. T. R. Wheelock. From Japan.
1 Long-necked Chelodine (*Chelodina longicollis*). Presented by Mr. John Brazier, C.M.Z.S.
2 Blue Jays (*Cyanocitta cristata*). Presented by Lord Londesborough, F.Z.S.
12 Alpine Newts (*Triton alpestris*). Purchased.
12 Marbled Newts (*Triton marmoratus*). Purchased.

19. 1 Concentric Terrapin (*Emys concentrica*). Deposited by Mrs. Buckland.
1 Serval (*Felis serval*), ♀. Presented by Mr. C. D. O'Connor. From West Coast of Africa.
1 Parasitic Kite (*Milvus parasiticus*). Presented by H.E. Governor Ussher. From West Coast of Africa.
1 Red-necked Bustard (*Eupodotis ruficollis*). Presented by Mr. C. D. O'Connor. From West Coast of Africa.
1 Denham's Bustard (*Otis denhami*). Presented by H.E. Governor Ussher. From West Coast of Africa.

20. 3 Spanish Terrapins (*Clemmys leprosa*). Presented by Mr. A. T. Wise. From Gibraltar.
1 Azara's Fox (*Canis azaræ*?), ♂. Presented by Dr. Palin, C.M.Z.S.
1 Red-and-Yellow Macaw (*Ara chloroptera*). Presented by Mr. M'Candlish.

22. 1 Cinereous Vulture (*Vultur cinereus*). Received in exchange.
2 Crested Pelicans (*Pelecanus crispus*). Received in exchange.
1 Crested Screamer (*Chauna chavaria*). Presented by Mr. Arthur C. Maxwell.

24. 3 Cuming's Octodons (*Octodon cumingii*). Born in the Menagerie.

25. 1 Long-billed Butcher bird (*Barita destructor*). Purchased.
1 Crested Screamer (*Chauna chavaria*). Presented by Mr. Higford Burr.

26. 1 Barbary Ape (*Macacus inuus*). Presented by Mr. H. G. Jalland.

Mar. 26. 1 Citron-crested Cockatoo (*Cacatua citrino-cristata*). Purchased.
1 Beatrix Antelope (*Oryx beatrix*). Deposited by Mr. J. Gwyn Jeffreys, F.Z.S.
30. 7 Short-nosed Sea-horses (*Hippocampus antiquorum*). Purchased.
31. 1 Humboldt's Penguin (*Spheniscus humboldti*). Presented by Major J. G. Sandemann, F.Z.S. From Guaycan, west coast of S. America.
2 Quebec Marmots (*Arctomys monax*). Born in the Menagerie.

Apr. 2. 1 Black Rat (*Mus rattus*). Presented by Mr. T. J. Pearsall.
3. 2 Pumas (*Felis concolor*), ♂ and ♀. Presented by Mr. C. Rickards. From Oaxaca, Mexico.
1 Indian Silver-bill (*Munia malabarica*). Purchased.
2 Maja Finches (*Munia maja*). Purchased.
2 Cape-Palmas Finches (*Amadina bicolor*). Purchased.
2 Hooded Finches (*Spermestes cucullata*). Purchased.
2 Serin Finches (*Serinus hortulanus*). Purchased.
2 Orange-cheeked Waxbills (*Estrelda melpoda*). Purchased.
4. 1 Striped Hyæna (*Hyæna striata*), ♀. Presented by Comm. W. H. Parker, R.N.
5. 2 Cape Crowned Cranes (*Balearica regulorum*). Presented by Capt. G. C. Swiney, A.D.C.
1 Ruff (*Machetes pugnax*), ♂. Presented by Mr. J. G. Harrison.
1 Common Curlew (*Numenius arquatus*), ♂. Presented by Mr. J. G. Harrison.
1 Rhesus Monkey (*Macacus erythræus*), ♂. Presented by Mr. Nasmith.
1 Gannet (*Sula bassana*). Presented by Mr. E. Frith.
8. 2 Grey Ichneumons (*Herpestes griseus*), ♂ and ♀. Presented by Mr. P. W. Charrington.
3 Tibetan Wolves (*Canis laniger*). Born in the Menagerie.
9. 1 Derbian Wallaby (*Halmaturus derbianus*), ♂. Born in the Menagerie.
2 Serin Finches (*Fringilla serinus*). Presented by Mr. F. Bond, F.Z.S.
10. 3 Boobook Owls (*Athene boobook*). Purchased.
1 Red-bellied Flying Squirrel (*Pteromys magnificus*). Purchased. Himalayas.
2 Peacock Pheasants (*Polyplectron chinquis*). Hatched in Gardens.
1 Freckled Goby (*Gobius minutus*). Purchased.
30 Lump Suckers (*Cyclopterus lumpus*). Purchased.
1 Lamprey (*Petromyzon marinus*). Purchased.
3 Lesser Weevers (*Trachinus vipera*). Purchased.
13. 1 Baird's Tapir (*Tapirus bairdi*), ♀. Purchased. From Corinto, Central America.
1 Hocheur Monkey (*Cercopithecus nictitans*), ♂. Purchased.
1 Bonnet-Monkey (*Macacus radiatus*), ♂. Purchased.
1 Chestnut-backed Weaver bird (*Hyphantornis castaneo-fusca*). Purchased.
14. 2 Spotted Hyænas (*Hyæna crocuta*). Born in the Menagerie.
2 Black-handed Spider Monkeys (*Ateles melanochir*), ♀. Purchased. From Panama.
1 White-throated Sapajou (*Cebus hypoleucus*), ♀. Purchased. From Panama.

Apr. 14. 1 Collared Peccary (*Dicotyles tajacu*), ♂. Purchased. From Panama.
1 Common Boa (*Boa constrictor*). Purchased. From Panama.
15. 1 Sykes's Monkey (*Cercopithecus albogularis*), ♀. Deposited.
1 Reeves's Muntjac (*Cervulus reevesii*), ♀. Deposited.
1 Pair Common Buntings (*Emberiza miliaria*). Purchased.
17. 2 Rosy-faced Parrakeets (*Agapornis roscicapilla*). Received in exchange.
4 Calandra Larks (*Melanocorypha calandra*). Presented by Mr. C. Taitt. From Portugal.
1 Marsh Harrier (*Circus æruginosus*). Presented by Mr. C. Taitt. Portugal.
18. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Rev. T. W. Wrench.
19. 4 Pairs of Brant Geese (*Bernicla brenta*). Purchased.
4 Tufted Ducks (*Fuligula cristata*), 2 ♂ and 2 ♀. Purchased.
3 Pintails (*Dafila acuta*), 2 ♂ and 1 ♀. Purchased.
20. 1 Slender Loris (*Loris gracilis*), ♂. Deposited.
22. 2 Rhinoceros Hornbills (*Buceros rhinoceros*), ♂ and ♀. Purchased.
4 Upland Geese (*Chloëphaga magellanica*). Hatched in the Gardens.
2 Tree-Pipits (*Anthus arboreus*). Purchased.
2 Maugé's Dasyures (*Dasyurus maugæi*), ♂ and ♀. Presented by Mr. G. Kendrick.
24. 4 Green Australian Tree-Frogs (*Pelodryas cærulea*). Presented by Dr. Hooker, C.B. Brisbane.
25. 1 Red Kangaroo (*Macropus rufus*). Born in the Menagerie.
26. 1 Grey Ichneumon (*Herpestes griseus*), ♂. Presented by Mr. J. H. Roberts.
2 Long-eared Owls (*Otus vulgaris*). Deposited.
27. 1 Guinea Baboon (*Cynocephalus sphinx*), ♂. Presented by Mr. T. Pannitz.
28. 1 Common Paradoxure (*Paradoxurus typus*). Purchased.
29. 1 White-throated Sapajou (*Cebus hypoleucus*), ♀. Purchased. Cartagena.
1 Pinche Monkey (*Midas œdipus*), ♂. Purchased. Cartagena.
30. 1 Great Kangaroo (*Macropus giganteus*), ♂. Born in the Menagerie.
2 Nonpareil Finches (*Cyanospiza ciris*), ♂. Presented by the Hon. and Rev. F. G. Dutton.
2 Guira Cuckoos (*Guira piririgua*). Deposited.

May 1. 1 Rufous-tailed Pheasant (*Euplocamus erythrophthalmus*), ♂. Purchased.
1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Capt. H. R. Abadie.
1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Mr. R. Campbell.
2. 1 Diana Monkey (*Cercopithecus diana*), ♂. Presented by Mr. F. Worrall.
1 Common Nuthatch (*Sitta cæsia*). Presented by Mr. F. Bond, F.Z.S.
1 Land-Rail (*Crex pratensis*). Purchased.
1 Whin-Chat (*Pratincola rubetra*). Purchased.
3. 1 Wheatear (*Saxicola œnanthe*). Purchased.
1 Common Whitethroat (*Sylvia cinerea*). Purchased.

May 3. 1 Black-faced Spider Monkey (*Ateles ater*), ♂. Purchased.
1 Variegated Spider Monkey (*Ateles variegatus*), ♀. Purchased.
1 White-throated Capuchin (*Cebus hypoleucus*), ♀. Purchased. Central America.
4. 1 Bonnet Monkey (*Macacus radiatus*), ♂. Received in exchange.
1 Black Swan (*Cygnus atratus*), ♂. Deposited.
6. 1 Aoudad (*Ovis tragelaphus*), ♀. Born in the Menagerie.
1 Derbian Wallaby (*Halmaturus derbianus*), ♀. Born in the Menagerie.
2 Nilotic Crocodiles (*Crocodilus vulgaris*). Presented by Mr. C. B. Mosse. West Africa.
2 Egyptian Monitors (*Monitor niloticus*). Presented by Mr. C. B. Mosse. West Africa.
4 Home's Cinixys (*Cinixys homeana*). Presented by Mr. C. B. Mosse. West Africa.
1 Derbian Sternothere (*Sternothærus derbianus*). Presented by Mr. C. B. Mosse. West Africa.
7. 1 Red-footed Douroucouli (*Nyctipithecus rufipes*), ♀. Purchased. Nicaragua.
1 Yellow-fronted Amazon (*Chrysotis ochrocephala*). Presented by Capt. Boyle.
8. 1 Bonnet-Monkey (*Macacus radiatus*), ♂. Presented by Mr. Joseph F. Green.
1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mr. Joseph F. Green.
1 Vulpine Phalanger (*Phalangista vulpina*), ♀. Presented by Mr. Joseph F. Green.
9. 12 European Tree-Frogs (*Hyla arborea*). Presented by Mr. F. Coleman.
10 Fire-bellied Toads (*Bombinator igneus*). Presented by Mr. F. Coleman.
1 Natterjack Toad (*Bufo calamita*). Presented by Mr. F. Coleman.
4 Spotted Salamanders (*Salamandra maculosa*). Presented by Mr. F. Coleman.
4 Sand-Lizards (*Lacerta agilis*). Presented by Mr. F. Coleman.
2 Wall-Lizards (*Lacerta muralis*). Presented by Mr. F. Coleman.
3 Slowworms (*Anguis fragilis*). Presented by Mr. F. Coleman.
5 Smooth Newts (*Triton punctatus*). Presented by Mr. F. Coleman.
1 pair of Rufous-tailed Pheasants (*Euplocamus erythrophthalmus*). Purchased.
3 Red-vented Bulbuls (*Pycnonotus hæmorrhous*). Purchased.
1 Australian Crow (*Corvus australis*). Purchased.
10. 1 Long-eared Owl (*Otus vulgaris*). Presented by Mr. J. S. Patey.
14. 1 Toque Monkey (*Macacus pileatus*), ♂. Presented by Mr. A. S. Redrup.
1 Chopi Starling (*Aplonus chopi*). Purchased.
1 Southern Brown Mynah (*Acridotheres mahrattensis*). Purchased.
4 Angulated Tortoises (*Chersina angulata*). Purchased.
2 White's Tree-Frogs (*Pelodryas cærulea*). Presented by Dr. Hooker, C.B. Brisbane.

May 14. 1 Bonelli's Eagle (*Aquila bonellii*). Presented by Major Howard Irby. Tangier.

16. 1 Isabelline Antelope (*Cervicapra isabellina*), ♂. Presented by Mr. J. J. de Lizardi, F.Z.S.
5 Spotted-billed Ducks (*Anas pœcilorhyncha*). Presented by Mr. E. Buck.
1 White-handed Gibbon (*Hylobates lar*), ♀. Presented by Lieut.-Col. Anson.
1 Derbian Wallaby (*Halmaturus derbianus*), ♂. Presented by Dr. R. H. Popham.

18. 1 Coati (*Nasua nasica*), ♀. Presented by Lewis Joel, Esq., C.M.Z.S.

19. 4 Ruddy Sheldrakes (*Tadorna rutila*). Hatched in the Gardens.

21. 5 Gold Pheasants (*Thaumalea picta*). Hatched in the Gardens.
2 Peacock Pheasants (*Polyplectron chinquis*). Hatched in the Gardens.

22. 2 Italian Fire-bellied Toads (*Bombinator pachypus*). Presented by Prof. H. Giglioli, C.M.Z.S. Italy.
1 Long-eared Owl (*Otus vulgaris*). Presented by Mr. G. S. Patey.
11 Chiloe Wigeons (*Mareca chilensis*). Hatched in the Gardens.

23. 1 Common Squirrel (*Sciurus vulgaris*). Presented by Miss Norman.

24. 1 Red-billed Tree-Duck (*Dendrocygna autumnalis*). Purchased.
1 Zebu (*Bos indicus*), ♀. Born in the Menagerie.
2 Red Brockets (*Cervus rufus*), ♂ and ♀. Purchased. From Maranham, Brazil.

26. 1 White-throated Capuchin (*Cebus hypoleucus*), ♂. Presented by Mrs. Leary.

27. 1 King Penguin (*Aptenodytes pennantii*). Deposited.
2 Argus Pheasants (*Argus giganteus*), ♂. Presented by Mr. J. G. Fanshawe, F.Z.S. Malacca.
1 African Civet Cat (*Viverra civetta*), ♂. Presented by Mr. J. A. Sketchley. Dahomey.

29. 2 Spotted-sided Finches (*Amadina lathami*). Purchased.
2 Turquoisine Parrakeets (*Euphema pulchella*), ♂ and ♀. Purchased.
2 Red-headed Weaver birds (*Foudia madagascariensis*). Purchased.
1 Common Magpie (*Pica caudata*). Presented by Mr. T. Broadwood. Norway.
7 Variegated Sheldrakes (*Tadorna variegata*). Hatched in the Gardens.

31. 1 Weeper Capuchin (*Cebus capucinus*), ♀. Presented by Miss L. E. Beard.

June 1. 1 pair of Vieillot's Firebacks (*Euplocamus vieilloti*). Purchased. Malacca.
4 Black-backed Porphyrios (*Porphyrio melanotus*). Presented by Dr. F. von Mueller, C.M.Z.S.

2. 1 Feline Douroucouli (*Nyctipithecus felinus*). Purchased.
1 Toco Toucan (*Ramphastos toco*). Purchased.
1 Blue-bearded Jay (*Cyanocorax cyanopogon*). Purchased.

3. 2 Brazilian Hang-nests (*Icterus jamaicai*). Deposited.

5. 1 Hybrid Mouflon (between *Ovis aries* ♂ and *O. musimon* ♀), ♀. Born in the Menagerie.

June 5. 1 Jerboa (*Dipus ægyptius*), ♀. Presented by Mr. E. T. Rogers C.M.Z.S.

6. 1 Lion (*Felis leo*), ♀. Purchased.
1 Coati, brown variety (*Nasua nasica*), ♂. Presented by Mr. R. E. Middleton.
6 Trumpeter Swans (*Cygnus buccinator*). Hatched in the Gardens.
3 Crested Pigeons (*Ocyphaps lophotes*). Hatched in the Gardens.

7. 4 Modest Grass-Finches (*Amadina modesta*). Purchased.
4 Banded Grass-Finches (*Poëphila cincta*). Purchased.
4 Bicheno's Finches (*Estrelda bichenovii*). Purchased.
2 Yellow-shouldered Weaver birds (*Euplectes capensis?*). Purchased.
1 Bonelli's Eagle (*Aquila bonellii*). Purchased.
1 Common Heron (*Ardea cinerea*). Presented by Mr. E. W. Harcourt, F.Z.S.
1 Japanese Deer (*Cervus sika*), ♂. Born in the Menagerie.
1 Spotted-tailed Dasyure (*Dasyurus maculatus*), ♂. Purchased.

10. 1 Burchell's Zebra (*Equus burchelli*). Born in the Menagerie.
1 Lineated Snake (*Zamenis caudilineatus*). Purchased.

11. 1 Mongoose Lemur (*Lemur mongoz*). Born in the Gardens.
9 Hybrid Pheasants (between *Thaumalea amherstiæ* ♂ and *T. picta* ♀). Born in the Gardens.
7 Hybrid Spotted-billed Ducks (between *Anas pœcilorhyncha* ♂ and half-bred *Anas pœcilorhyncha* ♀). Born in the Gardens.
3 Chilian Pintails (*Dafila spinicauda*). Born in the Menagerie.
1 Crab-eating Raccoon (*Procyon cancrivorus*). Presented by Mr. A. M. Sandbach.

13. 2 Marsh-Ichneumons (*Herpestes paludosus*). Born in the Menagerie.
5 White-crested Kaleeges (*Euplocamus albo-cristatus*). Hatched in the Gardens.
2 Black-backed Kaleeges (*Euplocamus melanotus*). Hatched in the Gardens.

14. 2 Vulturine Guinea-fowls (*Numida vulturina*). Presented by Dr. John Kirk, C.M.Z.S.
2 Peregrine Falcons (*Falco peregrinus*). Presented by Mr. Wm. Thompson.

15. 1 Hybrid Gayal (between *Bos indicus* ♂ and half-bred Gayal ♀). Born in the Menagerie.
1 Campbell's Monkey (*Cercopithecus campbelli*), ♀. Presented by Mrs. E. Ivey.

16. 3 Scarlet Ibis (*Ibis rubra*). Purchased.
5 Red-billed Tree-Ducks (*Dendrocygna autumnalis*). Purchased.

17. 1 Australian Monitor (*Monitor gouldi*). Presented by the Rev. Daniel Greatorex.
2 Peruvian Blue Jays (*Cyanocorax incas*). Purchased.
1 Common Nightingale (*Daulias luscinia*), ♂. Purchased.

18. 1 Moor-Monkey (*Semnopithecus maurus*), ♀. Purchased.
1 Red-vented Cockatoo (*Cacatua philippinarum*). Purchased. Negros, Philippines.
1 Golden-backed Hanging Parrakeet (*Loriculus chrysonotus*), ♂. Purchased. Cebu, Philippines.
1 Blue-breasted Lory (*Eos indica*). Purchased. Sanghi Islands.
1 Sykes's Monkey (*Cercopithecus albigularis*), ♂. Purchased.

June 18. 3 Ruddy Sheldrakes (*Tadorna rutila*), 2 ♂ and 1 ♀. Purchased.
2 Macqueen's Bustards (*Houbara macqueeni*), ♂ and ♀. Purchased.
3 pairs Black Francolins (*Francolinus vulgaris*). Purchased.
3 pairs Grey Francolins (*Francolinus ponticerianus*). Purchased.
3 pairs Black-bellied Sand-Grouse (*Pterocles arenarius*). Purchased.
1 pair Indian Dial-Birds (*Copsychus saularis*). Purchased.
1 pair Crested Larks (*Galerita cristata*). Purchased.
1 Indian Sky-Lark (*Alauda gulgula*). Purchased.
1 Madras Bush-Lark (*Mirafra affinis*). Purchased.
1 Markhoor (*Capra megaceros*), ♂. Born in the Menagerie.
19. 1 Vulpine Phalanger (*Phalangista vulpina*). Born in the Menagerie.
20. 1 Canadian Beaver (*Castor canadensis*). Born in the Menagerie.
1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Miss Perkins.
21. 1 Markhoor (*Capra megaceros*), ♀. Born in the Menagerie.
1 Egyptian Goose (*Chenalopex ægyptiaca*). Hatched in the Gardens.
1 Splendid Grass-Parrakeet (*Euphema splendida*). Purchased.
13 Hybrid Pheasants (between *Phasianus reevesii* ♂ and *P. wallichii* ♀). Hatched in the Gardens.
1 Leopard (*Felis pardus*), ♀. Presented by Capt. S. Grove, R.N.
22. 4 Chilian Pintails (*Dafila spinicauda*). Hatched in the Gardens.
1 Common Snake (*Tropidonotus natrix*). Presented by Mr. E. E. Hooper.
1 Persian Gazelle (*Gazella subgutturosa*). Presented by Miss Finnis.
24. 2 Lesser Black-backed Gulls (*Larus fuscus*). Hatched in the Gardens.
2 Australian Wild Ducks (*Anas superciliosa*). Hatched in the Gardens.
25. 1 African Leopard (*Felis pardus*), ♀. Deposited. West Coast of Africa.
1 Home's Cinixys (*Cinixys homeana*). Presented by Mr. H. T. Ussher, C.M.Z.S. West Coast of Africa.
1 Puff-Adder (*Vipera arietans*). Presented by Mr. H. T. Ussher, C.M.Z.S. West Coast of Africa.
1 Pluto Monkey (*Cercopithecus pluto*), ♂. Purchased. West Coast of Africa.
4 Imperial Eagles (*Aquila imperialis*). Deposited. Southern Spain.
2 Black-bellied Sand-Grouse (*Pterocles arenarius*), ♀. Deposited. Southern Spain.
1 Horned Lizard (*Phrynosoma cornutum*). Deposited. San Diego, California.
26. 1 Chilian Jackal (*Canis magellanicus*), ♀. Presented by Mr. W. Douglas.
1 Weeper Capuchin (*Cebus capucinus*), ♂. Presented by Mr. S. Julyarri.
27. 1 Ludio Monkey (*Cercopithecus ludio*), ♀. Purchased.
28. 1 Montague's Harrier (*Circus cinereaceus*). Presented by Lord Lilford, F.Z.S.

June 28. 1 Black-bellied Sand-Grouse (*Pterocles arenaria*), ♂. Deposited. Southern Spain.
1 Algerian Tortoise (*Testudo mauritanica*). Deposited. Southern Spain.
3 Spanish Terrapins (*Clemmys leprosa*). Presented by Mr. N. Davidson. Southern Spain.
3 Yellow-winged Blue Creepers (*Cæreba cyanea*), ♂. Presented by Mr. N. Davidson.
1 Thick-billed Violet Tanager (*Euphonia crassirostris*). Presented by Mr. N. Davidson. Central America.
1 Peruvian Thicknee (*Œdicnemus superciliaris*). Presented by Mr. N. Davidson.
2 Yellow-winged Blue Creepers (*Cæreba cyanea*). Deposited.
12 Black Tortoises (*Testudo carbonaria*). Purchased. Colon.
2 Annulated Terrapins (*Clemmys annulata*). Purchased. Colon.
1 Common Boa (*Boa constrictor*). Purchased. Columbia.
1 Tovi Parrakeet (*Brotogerys tovi*). Purchased. Columbia.
2 White-throated Sapajous (*Cebus hypoleucus*), ♂ and ♀. Purchased. Columbia.
1 Green Monkey (*Cercopithecus callitrichus*), ♂. Purchased.
1 Kinkajou (*Cercoleptes caudivolvulus*), ♀. Purchased.
2 Common Guinea-fowls (*Numida meleagris*). Purchased.
29. 1 Snowy Owl (*Nyctea nivea*). Purchased.
1 Grey Parrot (*Psittacus erithacus*). Presented by Mr. G. Simmonds.
1 Great Eagle-Owl (*Bubo maximus*). Presented by Mrs. Stapleton.
4 Widgeons (*Mareca penelope*). Hatched in the Gardens.

July 2. 1 Pluto Monkey (*Cercopithecus pluto*), ♂. Received in exchange.
2 Common Cormorants (*Phalacrocorax carbo*). Deposited.
3. 2 Green Woodpeckers (*Picus viridis*). Purchased.
1 Duiker-bock (*Cephalophus mergens*). Presented by Mr. F. R. Lee, F.Z.S.
4. 2 Green Glossy Starlings (*Lamprocolius chalybeus*). Hatched in the Gardens.
1 Goshawk (*Astur palumbarius*). Deposited.
1 Angola Vulture (*Gypohierax angolensis*). Presented by Mr. H. F. Blissett. West Coast of Africa.
2 Hissing Sand-Snakes (*Psammophis sibilans*). Presented by Mr. C. B. Mosse, C.M.Z.S. West Coast of Africa.
3 Slender Sand-Snakes (*Psammophis elegans*). Presented by Mr. C. B. Mosse, C.M.Z.S. West Coast of Africa.
2 Pale Genets (*Genetta senegalensis*). Presented by Mr. C. B. Mosse, C.M.Z.S. West Coast of Africa.
5. 2 Mocking-birds (*Mimus polyglottus*), ♂ and ♀. Presented by Mr. W. Morgan.
3 Common Nightingales (*Daulias luscinia*), 2 ♂ and 1 ♀. Presented by Mr. W. Morgan.
8. 4 Lions (*Felis leo*). Born in the Menagerie.
7 Shovellers (*Spatula clypeata*). Hatched in the Gardens.
1 Grey-necked Serin Finch (*Serinus canicollis*). Received in exchange.
1 Pileated Song-Sparrow (*Zonotrichia pileata*). Received in exchange.

July 9. 5 Chukar Partridges (*Caccabis chukar*). Hatched in the Gardens.
4 Hybrid Pheasants (between *P. reevesi* ♂ and *P. wallichii* ♀). Hatched in the Gardens.
10. 1 Coati (*Nasua nasica*). Presented by Mr. C. Vaudin.
1 Vervet Monkey (*Cercopithecus lalandii*). Presented by H.H. Prince Dhuleep Singh, F.Z.S.
13. 1 Argus Pheasant (*Argus giganteus*). Deposited.
15. 1 Malabar Squirrel (*Sciurus maximus*), ♀. Presented by Mrs. Scoussmaker.
3 Crested Pigeons (*Ocyphaps lophotes*). Hatched in the Gardens.
16. 1 Four-spotted Opossum (*Didelphys opossum*). Purchased.
2 Black Vultures (*Cathartes atratus*). Purchased.
1 Hawk-billed Turtle (*Chelone imbricata*). Purchased.
1 Cape Crowned Crane (*Balearica regulorum*). Presented by Col. Gray.
1 Globose Curassow (*Crax globicera*). Purchased.
2 Crested Curassows (*Crax alector*). Presented by Mr. Q. Hogg.
1 Blue-and-Yellow Macaw (*Ara ararauna*). Presented by Mr. Q. Hogg.
1 Virginian Eagle Owl (*Bubo virginianus*). Presented by Mr. A. Laurie.
1 Mocking-bird (*Mimus polyglottus*), ♂. Deposited.
1 Mocking-bird (*Mimus polyglottus*), ♀. Presented by Dr. Bree, F.Z.S.
18. 1 Rhesus Monkey (*Macacus erythræus*), ♂. Presented by Mr. Clayton.
1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Mr. Clayton.
2 Silky Monkeys (*Midas rosalia*), ♂ and ♀. Purchased.
1 Small Spotted Dog-fish (*Scyllium canicula*). Purchased.
3 Picked Dog-fish (*Spinax acanthias*). Purchased.
2 Yellow-fronted Amazons (*Chrysotis ochrocephala*). Presented by Mr. A. Warmington.
19. 12 Natterer's Bats (*Vespertilio nattereri*). Presented by Lord Lilford, F.Z.S.
4 Mandarin Ducks (*Aix galericulata*). Hatched in the Gardens.
21. 1 Splendid Grass-Parrakeet (*Euphema splendida*). Hatched in the Gardens.
22. 1 Hybrid Pheasant (between *P. reevesii* ♂ and *P. wallichii* ♀). Hatched in the Gardens.
23. 1 Macaque Monkey (*Macacus cynomolgus*). Deposited.
1 Bonnet Monkey (*Macacus radiatus*), ♀. Deposited.
24. 1 Saffron Finch (*Sycalis flaveola*). Deposited.
1 Yellow-footed Rock-Kangaroo (*Petrogale xanthopus*), ♂. Presented by Mr. J. S. Hayward.
29. 2 Feline Douroucoulis (*Nyctipithecus felinus*), ♂ and ♀. Received in exchange.
1 Bosman's Potto (*Perodicticus potto*), ♂. Received in exchange.
1 Long-tailed Copsychus (*Copsychus macrurus*). Presented by Major T. R. Stack.
2 Slow Loris (*Nycticebus tardigradus*), ♂. Presented by Dr. Dodds.
3 Common Nightingales (*Daulias luscinia*), ♂. Presented by Mr. W. Morgan.

July 29. 1 Chacma Baboon (*Cynocephalus porcarius*), ♂. Presented by Mr. Henry Hand.

30. 1 Sykes's Monkey (*Cercopithecus albogularis*), ♂. Presented by Lieut. F. R. H. Lambert.
4 Sulphur-breasted Toucans (*Rhamphastos carinatus*). Purchased.
1 Common Adder (*Vipera berus*). Deposited.
1 Horned Lizard (*Phrynosoma cornutum*). Presented by Mr. H. D. Harrison.
5 Three-toed Seps (*Seps tridactylus*). Presented by Mr. W. C. Tait. Portugal.

31. 1 Rufous Tinamou (*Rhynchotus rufescens*). Presented by Mr. C. L. Getting.

Aug. 1. 1 Yellow-headed Conure (*Conurus jendaya*). Presented by Mr. J. R. Symon.
1 Golden Agouti (*Dasyprocta agouti*). Born in the Menagerie.
2 Mocking-birds (*Mimus polyglottus*), ♂ and ♀. Presented by Mr. W. Morgan.
1 Common Cuckoo (*Cuculus canorus*). Presented by Mr. J. Travers Smith, F.Z.S.
1 Red-and-Blue Macaw (*Ara macao*). Deposited.

2. 1 Dunlin (*Tringa cinclus*). Presented by Mr. H. M. Upcher, F.Z.S.

3. 1 Wapiti Deer (*Cervus canadensis*). Born in the Menagerie.
1 Sumatran Rhinoceros (*Rhinoceros sumatrensis*), ♀. Purchased.

4. 2 Fulvous Tree-Ducks (*Dendrocygna fulva*). Hatched in the Gardens.

6. 1 Eland (*Oreas canna*), ♀. Born in the Menagerie.
1 Bennett's Wallaby (*Halmaturus bennettii*), ♂. Born in the Menagerie.
1 Water Viper (*Cenchris piscivorus*). Received in exchange.
2 Moccasin Snakes (*Tropidonotus fasciatus*). Received in exchange.
2 Seven-banded Snakes (*Tropidonotus leberis*). Received in exchange.
2 Laughing Gulls (*Larus atricilla*), ♂ and ♀. Received in exchange.
1 Red-and-Blue Macaw (*Ara macao*). Presented by Mr. A. W. Deichmann.
1 Common Sandpiper (*Tringoides hypoleucos*). Purchased.
1 Crested Porcupine (*Hystrix cristata*). Born in the Menagerie.
2 African Buzzards (*Buteo tachardus*). Purchased.

7. 1 Binturong (*Arctictis binturong*). Purchased.
1 Red Howler (*Mycetes seniculus*), ♂. Purchased.

8. 1 Vulpine Phalanger (*Phalangista vulpina*), ♂. Presented by the Hon. D. Stanhope.
1 Vulpine Phalanger (*Phalangista vulpina*), ♂. Presented by Miss Attwood.
1 Rose-bill Parrakeet (*Platycercus eximius*). Presented by Mr. H. Nicholl.
2 Sambur Deer (*Cervus aristotelis*), ♂ and ♀. Presented by Mr. J. K. Welch.
1 Emu (*Dromæus novæ-hollandiæ*), ♀. Purchased.

Aug. 8. 2 Pinche Monkeys (*Midas œdipus*), ♀. Purchased.
2 Geoffroy's Marmosets (*Midas geoffroyii*), ♂. Purchased.
11. 1 Eland (*Oreas canna*), ♂. Born in the Menagerie.
12. 1 Rhesus Monkey (*Macacus erythræus*), ♂. Presented by Mr. W. Watts.
1 White-cheeked Capuchin (*Cebus lunatus*), ♀. Deposited.
13. 2 Chinese Mynahs (*Acridotheres cristatellus*). Purchased.
1 Common Chameleon (*Chamæleon vulgaris*). Presented by Mr. A. R. Rogers.
15. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. S. E. Phillips.
2 Common Barn-Owls (*Strix flammea*). Presented by Mr. F. Kidner.
1 Egyptian Vulture (*Neophron percnopterus*). Deposited.
1 Black Kite (*Milvus migrans*). Deposited.
16. 1 Common Snake (*Tropidonotus natrix*). Presented by Mr. J. Roach.
1 Common Snake (*Tropidonotus natrix*). Presented by Mr. A. J. Woodhouse.
1 Common Gull (*Larus canus*). Presented by Dr. Stewart.
1 Cape Ant-Bear (*Orycteropus capensis*). Deposited.
17. 1 Honey-Buzzard (*Pernis apivorus*). Presented by Mr. L. Cumberbatch.
19. 1 Squirrel Monkey (*Saimaris sciurea*), ♂. Deposited.
1 Great Eagle Owl (*Bubo maximus*). Presented by Mr. R. Wilkins.
2 Common Nightjars (*Caprimulgus europæus*). Deposited.
1 Moor Monkey (*Semnopithecus maurus*), ♀. Purchased.
1 White-fronted Capuchin (*Cebus albifrons*), ♂. Purchased.
2 Smooth-headed Capuchins (*Cebus monachus*), ♀. Purchased.
1 Pileated Parrakeet (*Platycercus pileatus*). Purchased.
1 Japanese Deer (*Cervus sika*). Received in exchange.
1 Talapoin Monkey (*Cercopithecus talapoin*), ♂. Presented by Mr. C. B. Maseyk.
21. 6 Silver Pheasants (*Euplocamus nycthemerus*). Presented by Mr. J. P. Davis.
3 Gold Pheasants (*Thaumalea picta*). Presented by Mr. J. P. Davis.
22. 1 Sun-Bittern (*Eurypyga helias*). Hatched in the Gardens.
23. 1 Common Boa (*Boa constrictor*). Presented by Mr. R. Collin.
24. 1 Iceland Falcon (*Falco islandus*). Deposited.
26. 1 Mantchurian Deer (*Cervus mantchuricus*). Deposited.
1 Condor Vulture (*Sarcorhamphus gryphus*). Deposited.
27. 1 Vervet Monkey (*Cercopithecus lalandii*), ♂. Presented by Mr. T. A. Dixon.
1 Weeper Capuchin (*Cebus capucinus*), ♀. Presented by Lady Kingston.
1 King Parrakeet (*Aprosmictus scapulatus*). Deposited.
4 Common Adders (*Vipera berus*). Born in the Menagerie.
5 Seven-banded Snakes (*Tropidonotus leberis*). Born in the Menagerie.
28. 2 Crested Pigeons (*Ocyphaps lophotes*). Hatched in the Gardens.
29. 1 Blue-fronted Amazon (*Chrysotis amazonica*). Purchased.
5 Banded Tinamous (*Crypturus noctivagus*). Purchased.
3 Gambel's Partridges (*Callipela gambelli*). Received in exchange.

Aug. 29. 1 Common Chameleon (*Chamæleon vulgaris*). Presented by Mr. T. W. Wood.
2 Pine Grosbeaks (*Corythus enucleator*). Presented by Messrs. E. A. Alston, F.Z.S., and J. A. H. Browne.
2 Chipping Squirrels (*Tamias striatus*). Purchased.
31. 1 Kea or Mountain-Parrot (*Nestor notabilis*). Presented by Accl. Soc. of Canterbury, N. Z.
1 Black-tailed Flower-bird (*Anthornis melanura*). Presented by Accl. Soc. of Canterbury, N. Z.
6 Lateral White-eyes (*Zosterops lateralis*). Presented by Mr. Bills.

Sept. 2. 1 Lesser Spotted Woodpecker (*Picus minor*). Purchased.
3. 11 Common Adders (*Vipera berus*). Presented by Mr. F. D. Drewitt.
5. 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Mr. James Norris.
6. 4 African Lepidosirens (*Protopterus annectens*). Purchased.
7. 1 Philantomba Antelope (*Cephalophus maxwelli*), ♂. Born in the Menagerie.
8. 2 Silky Marmosets (*Midas rosalia*), ♂ and ♀. Purchased.
1 Bay Cow-bird (*Molothrus badius*). Purchased.
9. 4 Violet Tanagers (*Euphonia violacea*). Presented by Capt. Jarvis.
1 Brazilian Hangnest (*Icterus jamaicai*). Presented by Mrs. Jarvis.
10. 1 North-African Jackal (*Canis anthus*), ♂. Presented by Lord Lilford, F.Z.S. From Southern Spain.
1 Common Wombat (*Phascolomys wombat*), ♀. Presented by Mr. James Galbraith.
11. 1 One-streaked Hawk (*Melierax monogrammicus*). Presented by Lord Lilford, F.Z.S.
12. 2 Ruddy Flamingos (*Phœnicopterus ruber*). Deposited.
1 Gannet (*Sula bassana*). Presented by Mr. J. Foster.
13. 3 Black-faced Spider Monkeys (*Ateles ater*), ♀. Purchased. Nicaragua.
1 White-throated Capuchin (*Cebus hypoleucus*), ♀. Purchased. Panama.
2 Crested Curassows (*Crax alector*), ♀. Purchased. Demerara.
1 Annulated Snake (*Leptodira annulata*). Purchased. Panama.
1 Red-and-Black Snake (*Erythrolamprus venustissimus*). Purchased. Panama.
1 Coati (*Nasua nasica*), ♀. Presented by Dr. Buhot. Tobago.
7 Wrinkled Terrapins (*Clemmys rugosa*). Purchased.
1 Adorned Terrapin (*Clemmys ornata*). Purchased.
14. 1 Banded Ichneumon (*Herpestes fasciatus*), ♀. Presented by Dr. Barbour.
16. 3 Hairy Armadillos (*Dasypus villosus*), 2 ♂ and 1 ♀. Presented by Mr. F. Parish, C.M.Z.S. Buenos Ayres.
1 Collared Peccary (*Dicotyles tajacu*). Purchased.
2 West-Indian Rails (*Aramides cayennensis*). Purchased.
2 Blue-bearded Jays (*Cyanocorax cyanopogon*). Purchased.
2 Common Barn-Owls (*Strix flammea*). Purchased.
17. 1 Moorish Tortoise (*Testudo mauritanica*). Presented by Mr. W. Heslop. Crimea.

Sept. 17. 1 Capercailzie (*Tetrao urogallus*), ♂. Presented by Mr. Percy S. Godman.
18. 2 Placid Ground-Doves (*Geopelia placida*). Presented by Capt. Thacker.
20. 1 Common Chameleon (*Chamæleon vulgaris*). Presented by Miss Morgan.
1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mr. M. C. Key.
21. 1 Golden Plover (*Charadrius pluvialis*). Presented by Major Thompson.
1 Gannet (*Sula bassana*). Presented by R. Beveridge, Esq.
23. 1 Vulpine Phalanger (*Phalangista vulpina*), ♀. Presented by Mr. R. Cranston, Jun.
1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by the Hon. Chas. Lowther.
1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Mr. T. Crook.
3 New-Zealand Parrakeets (*Cyanorhamphus novæ zealandiæ*). Purchased.
3 Golden-headed Parrakeets (*Cyanorhamphus auriceps*). Purchased.
2 Alpine Parrakeets (*Cyanorhamphus alpinus*). Purchased.
24. 1 Robben-Island Snake (*Coronella phocarum*). Presented by Mr. G. H. B. Fisk. Robben Island, S. Africa.
25. 2 Common Guillemots (*Uria troile*). Presented by Mr. W. H. Scratten, F.Z.S.
3 Wild Cats (*Felis catus*), 1 ♂ and 2 ♀. Presented by the Earl of Seafield, F.Z.S.
1 Bennett's Wallaby (*Halmaturus bennettii*), ♀. Presented by Mrs. M'Causland.
1 Platyrhine Wombat (*Phascolomys platyrhinus*), ♀. Presented by Dr. F. Von Mueller, C.M.Z.S.
26. 1 White-fronted Lemur (*Lemur albifrons*), ♀. Purchased.
1 Garnett's Galago (*Galago garnettii*), ♀. Purchased.
2 Red-eared Conures (*Conurus cruentatus*). Purchased. South America.
27. 1 Common Chameleon (*Chamæleon vulgaris*). Presented by Mr. G. Hollis.
30. 1 Laughing Kingfisher (*Dacelo gigantea*). Presented by Mr. J. S. Cooke.
2 Variegated Sheldrakes (*Tadorna variegata*), ♂. Presented by Mr. Bills.
1 Slow Loris (*Nyctipithecus tardigradus*), ♀. Presented by Capt. Ahlfors.

Oct. 1. 6 Cuming's Octodons (*Octodon cumingii*). Born in the Menagerie.
2 Black-handed Spider Monkeys (*Ateles melanochir*), ♀. Purchased. Colon.
1 White-throated Capuchin (*Cebus hypoleucus*), ♂. Purchased. Cartagena.
1 Hoffmann's Sloth (*Cholopus hoffmanni*). Purchased. Panama.
1 Ocelot (*Felis pardalis*), ♀. Purchased. Panama.
1 Coati (*Nasua nasica*), ♀. Purchased. Vera Cruz.
2 Crab-eating Raccoons (*Procyon lotor*), ♂ and ♀. Purchased. Colon.

Oct. 2. 3 New-Zealand Kingfishers (*Halcyon vagans*). Received in exchange.
4. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Deposited.
5. 1 Golden Eagle (*Aquila chrysaëtos*). Presented by the Rev. D. Smithard Hind.
6. 2 Waxwings (*Ampelis garrulus*), ♂ and ♀. Presented by Mr. S. Schaefer.
8. 2 Laughing Kingfishers (*Dacelo gigantea*), ♂ and ♀. Presented by Mr. T. Hanbury.
1 Nonpareil Finch (*Cyanospiza ciris*). Presented by Mrs. Grenville.
1 Yellow-shouldered Weaver bird (*Euplectes capensis*). Presented by Mrs. Grenville.
1 Lovebird Parrakeet (*Agapornis pullaria*), ♂. Presented by Mrs. Grenville.
1 Raven (*Corrus corax*). Presented by Mr. A. W. Hill.
10. 1 Owen's Apteryx (*Apteryx owenii*). Received in exchange.
1 Large Apteryx (*Apteryx australis*). Received in exchange.
1 Grey-cheeked Monkey (*Cercocebus albigena*), ♂. Received in exchange.
4 pairs of Crested Colins (*Eupsychortyx cristatus*). Received in exchange.
14. 1 Hawk Owl (*Surnia funerea*). Presented by Capt. D. Herd, C.M.Z.S.
1 Osprey (*Pandion haliætus*). Presented by Capt. D. Herd, C.M.Z.S.
1 Rhesus Monkey (*Macacus erythræus*). Deposited.
1 Spotted Dove (*Columba maculosa*). Deposited.
1 pair Bronzed-winged Pigeons (*Phaps chalcoptera*). Deposited.
1 Globose Curassow (*Crax globicera*). Presented by Capt. Le Breton Butler.
1 Great American Egret (*Ardea egretta*). Deposited.
2 Derbian Screamers (*Chauna derbiana*). Deposited.
16. 1 King Vulture (*Gyparchus papa*). Purchased.
17. 4 Zebus (*Bos indicus*). Deposited.
1 Grey Ichneumon (*Herpestes griseus*). Presented by Mr. W. Henderson.
18. 1 Gannet (*Sula bassana*). Presented by Mr. S. Sanderson.
1 Bonnet-Monkey (*Macacus radiatus*). Presented by Dr. James Riley.
2 Ariel Toucans (*Ramphastos ariel*). Purchased.
19. 1 Peregrine Falcon (*Falco peregrinus*). Presented by Capt. J. A. Martyn. Captured at Sea.
21. 1 Mortier's Water-hen (*Tribonyx mortieri*). Purchased. From New Zealand.
24. 1 Weka Rail (*Ocydromus australis*). Purchased. From Otago, New Zealand.
26. 1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mr. Thomas Toon.
28. 2 Leopards (*Felis pardus*). Born in the Menagerie.
1 Schlegel's Civet (*Viverricula schlegeli*). Presented by Mr. C. E. Bewsher. From Johanna, Comoro Islands.
29. 1 Common Buzzard (*Buteo vulgaris*). Presented by Sir Hugh Williams.

Nov. 1. 1 Grey Ichneumon (*Herpestes griseus*), ♂. Presented by Mr. J. Chamberlain.

Nov. 1. 2 Timneh Parrots (*Psittacus timneh*). Purchased.
2. 1 Royal Python (*Python regius*). Presented by Mr. Henry Wyatt.
1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. W. Watts. Siam.
2 Starred Tortoises (*Testudo stellata*). Presented by W. Vincent Legge, Esq., R.A., C.M.Z.S. From Ceylon.
5. 1 Hippopotamus (*Hippopotamus amphibius*), ♂. Born in the Menagerie.
2 Naked-footed Owls (*Athene noctua*). Presented by Mr. W. H. Scratten, F.Z.S.
1 Gaimard's Rat Kangaroo (*Hypsiprymnus gaimardi*), ♀. Deposited.
7. 1 Rhesus Monkey (*Macacus erythræus*). Presented by Dr. Reed.
8. 1 Brown Howler (*Mycetes fuscus*), ♂. Purchased.
9. 1 Javan Peafowl (*Pavo muticus*), ♂. Presented by Sir Charles Smith.
1 Nippon Ibis (*Ibis nippon*). Presented by Mr. R. Swinhoe, F.Z.S. China.
1 Chinese Tree-Pie (*Dendrocitta sinensis*). Presented by Mr. R. Swinhoe, F.Z.S. China.
1 Grey-breasted Squirrel (*Sciurus griseopectus*). Presented by Mr. R. Swinhoe, F.Z.S. China.
13. 1 Bonnet-Monkey (*Macacus radiatus*). Presented by Miss Matson.
14. 1 Mandarin Duck (*Aix galericulata*). Purchased.
15. 2 Grey Seals (*Halichœrus grypus*). Purchased.
16. 2 Lesser Vasa Parrakeets (*Coracopsis nigra*). Purchased.
18. 1 Leucoryx (*Oryx leucoryx*), ♀. Deposited.
19. 1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mr. Henry Russell.
20. 1 Suricate (*Suricata zenik*). Deposited.
21. 2 White-banded Squirrels (*Sciurus erythropus*). Presented by Mr. James R. Philpott.
22. 1 Little Armadillo (*Dasypus minutus*), ♀. Purchased.
2 Ceylon Hanging Parrakeets (*Loriculus asiaticus*). Purchased.
1 Eyebrowed Thrush (*Leucodioptrum chinense*). Purchased.
1 White-handed Gibbon (*Hylobates lar*), ♂. Deposited.
1 Grey Struthidea (*Struthidea cinerea*). Deposited.
1 Red-fronted Lory (*Chalcopsitta scintillata*). Purchased.
23. 1 Maximilian's Aracari (*Pteroglossus wiedi*). Received in exchange.
26. 1 Bonnet-Monkey (*Macacus radiatus*), ♀. Presented by Mr. William Blackmore.
27. 4 Black-bellied Weaver birds (*Euplectes afer*). Received in exchange.
4 Common Crowned Weaver birds (*Euplectes flammiceps*). Received in exchange.
1 Masked Weaver bird (*Hyphantornis personata*). Received in exchange.
29. 2 Tree-Pipits (*Anthus arboreus*). Purchased.
1 Grey Wagtail (*Motacilla sulphurea*). Purchased.
30. 1 Crested Agouti (*Dasyprocta cristata*?). Born in the Menagerie.

Dec. 1. 1 Black-handed Spider Monkey (*Ateles melanochir*), ♀. Purchased.
1 Black-faced Spider Monkey (*Ateles ater*), ♀. Purchased.
3 White-throated Capuchins (*Cebus hypoleucus*), 2 ♂ and 1 ♀. Purchased.
1 Feline Douroucouli (*Nyctipithecus felinus*), ♂. Purchased.
3 Mexican Deer (*Cervus mexicanus*), 2 ♀ and 1 ♂. Purchased. From Vera Cruz.
1 Crested Agouti (*Dasyprocta cristata*), ♂. Purchased. From Colon.
7 Hawk's-billed Turtles (*Chelone imbricata*). Purchased.
1 Annulated Snake (*Leptodira annulata*). Purchased. Panama.
2. 2 Kingfishers (*Alcedo ispida*). Presented by Mr. J. Furness.
3. 1 Horseshoe Snake (*Zamenis hippocrepis*). Purchased.
4. 1 Vulpine Phalanger (*Phalangista vulpina*), ♀. Born in the Menagerie.
1 Pileated Jay (*Cyanocorax pileatus*). Presented by Mr. E. B. Webb.
1 Eland (*Oreas canna*), ♂. Deposited.
2 Double-crested Pigeons (*Lopholæmus antarcticus*). Deposited.
1 King Parrakeet, pale variety (*Aprosmictus scapulatus*). Deposited.
6. 1 Australian Quail (*Synœcus australis*). Purchased.
11. 1 Gavial (*Gavialis gangeticus*). Presented by Dr. John Anderson.
1 Indian Badger (*Arctonyx collaris*). Presented by Lieut.-Col. Hildebrand.
1 Grey Flying-Squirrel (*Sciuropterus fimbriatus*). Presented by Capt. the Hon. G. Napier. From Simla.
1 Crested Porcupine (*Hystrix cristata*). Presented by Major H. G. Elliot.
2 Ceylonese Terrapins (*Clemmys trijuga*). Presented by Capt. Wilkinson. From Ceylon.
1 Starred Tortoise (*Testudo stellata*). Presented by Capt. Wilkinson. From Ceylon.
12. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. H. Speed.
14. 1 Red Tiger Cat (*Felis planiceps*). Purchased.
15. 1 Squirrel Monkey (*Saimaris sciurea*), ♀. Presented by Mr. Catterson Smith.
16. 1 Cape Buffalo (*Bubalus caffer*), ♂. Born in the Menagerie.
1 Vulpine Phalanger (*Phalangista vulpina*). Born in the Menagerie.
18. 2 Crested Ground-Parrakeets (*Calopsitta novæ hollandiæ*). Hatched in the Gardens.
1 Greater Sulphur-crested Cockatoo (*Cacatua galerita*). Deposited.
1 Rhesus Monkey (*Macacus erythræus*), ♀. Presented by Mrs. Hunter.
1 Maguari Stork (*Ciconia maguari*). Purchased.
1 White-bellied Guan (*Ortalida albiventris*). Purchased. From Pernambuco.
19. 2 Bare-faced Fruit-Pigeons (*Treron calva*). Purchased. From West Africa.
2 Yellow-fronted Amazons (*Chrysotis ochrocephala*). Deposited.

Dec. 20. 1 King Vulture (*Gyparchus papa*), ♂. Presented by Mr. P. Stuart.

21. 2 Grivet Monkeys (*Cercopithecus griseo-viridis*). Presented by Dr. Hosmer.

1 Bonnet-Monkey (*Macacus radiatus*), ♀. Deposited.

28. 1 Eyra Cat (*Felis eyra*). Purchased. From Maranham.

1 Feline Douroucouli (*Nyctipithecus felinus*). Purchased. From Maranham.

1 American Darter (*Plotus anhinga*). Purchased. From Maranham.

1 Black-necked Stilt (*Himantopus nigricollis*). Purchased. From Maranham.

INDEX.

Ablabes
baliodirus, 590.
fuscus, 392.
longicaudus, 590.
melanocephalus, 590.
periops, 590, 595.
polyhemizona, 590.
schlegelii, 590.
Acanthylis
gigantea, 419.
Acca
matuta, 561.
Accipiter
francesi, 868.
madagascariensis, 868.
nisus, 411.
virgatus, 411.
Achatina
casiaca, 517.
obtusa, 517.
Achatinella
wakefieldiæ, 807.
(Frickella) *jacksonensis*, 807.
Acicula
tersa, 515.
Acridotheres
tristis, 462.
Acrocephalus
dumetorum, 455, 457.
Acrochordus
javanicus, 591.
Actinemys
marmorata, 872, 873.
Actitis
glareola, 474.
hypoleucus, 89, 106, 474.
incanus, 89, 106.
ochropus, 474.
Adeniophis
nigro-tæniatus, 591.
Ægialites
cantianus, 471.
dubius, 471.
Ægialites
falklandica, 549.
geoffroyii, 471.
mongolicus, 471.
philippensis, 471.
pyrrhothorax, 471.
Ægocerus
pictus, 689.
Agama
agilis, 384.
lessonæ, 384.
mutabilis, 386.
Agelena
syriaca, 273, 348.
Agrisius
fuliginosus, 571, 582.
Agrœca
lycosiformis, 258, 348, 354.
Alauda
gulgula, 465.
Alcedo
bengalensis, 424.
Alcelaphus
bubalus, 643.
Alcippe
atriceps, 446.
nigrifrons, 405, 446.
Alecthelia
durvillei, 103.
Allenii
gabonensis, 860.
Aloa
nigricans, 572.
sipahi, 573.
Alompra
ferruginea, 580, 582.
Alsconax
latirostris, 441.
terricolor, 441.
Alsocomus
puniceus, 466.
Amaurobius
distinctus, 263, 264, 348.
indistinctus, 264, 348.
Amaurobius
putus, 262, 348.
ruficeps, 264, 348.
simplex, 262, 263, 264, 348.
Amblycephalus
boa, 591.
Ammodytes
lancea, 834.
Amphiesma
lindmanni, 590.
rufotorquatum, 590.
Amphiperas
ovoideus, 10, 15.
Amphixestus
beccarii, 588.
Anæretes
parulus, 543, 549.
Anas
atricapilla, 370.
bicolor, 370.
collaris, 370.
cyanorhyncha, 368.
leucophrys, 367.
luzonica, 108.
melanocephala, 370.
pelewensis, 108.
pœcilorhyncha, 479, 729.
superciliosa, 90, 108.
Anastomus
oscitans, 479.
Anguilla
vulgaris, 834.
Anguis
fragilis, 377.
orientalis, 376.
Anodon
chiquitana, 687.
Anomalocardia
transversalis, 11, 15.
Anous
leucocapillus, 114.
stolidus, 90, 113, 114.
tenuirostris, 90, 113, 114.

Anser
albatus, 519, 520, 521.
hyperboreus, 520, 521.
inornatus, 366.
rossii, 520, 521.
Anserella
coromandeliana, 479, 480.
Anthus
correndera. 7, 548.
Antilocapra
americana, 495.
Antilope
pygmæa, 641.
regia, 641.
saltiana, 643.
scoparia, 642.
sœmmeringii, 601.
spinigera, 641.
tragulus, 642.
Antrostomus
rutilus, 652.
Aperostoma
montezumi, 686, 687.
Apona
pallida, 579.
plumosa, 579.
Aporia
soracta, 58.
Appias
abnormis, 48.
acrisa, 44.
ada, 47.
agave, 44.
albina, 43, 49.
albomaculatus, 51.
alope, 43.
amarella, 44.
andrea, 48.
asterope, 47.
athama, 45.
bouruensis, 46.
cardena, 43.
castalea, 50.
celestina, 45.
clavis, 47.
clementina, 45.
corinna, 45.
cycinna, 45.
cynisca, 45.
darada, 49.
domitia, 46.
drusilla, 50.
durvasi, 50.
ega, 44.
eleonora, 47.
eliada, 46.
enarete, 47.
eumelis, 45.
fatime, 46.
formosana, 48.
Appias
galathea, 43.
galba, 46.
hippo, 47.
hombronii, 43.
ilaire, 49, 50.
indra, 50.
ithome, 47.
lalage, 50.
leptis, 44.
liberia, 45.
libythea, 49.
lucasii, 50.
lycaste, 48.
lynceola, 48.
lyncida, 48.
margarita, 50.
melania, 45.
molpodia, 50.
neombo, 44.
nephele, 47.
nero, 46.
panda, 48.
pandione, 50.
panthea, 48.
paulina, 44.
phœbe, 51.
placidia, 46.
poeyi, 49.
psyche, 43.
saba, 49.
urania, 44.
vacans, 47.
zamboanga, 46.
zamora, 51.
zarinda, 46.
zelmira, 49.
Apterodytes
pennanti, 183.
Apterygodon
vittatum, 589.
Apteryx
australis, 861.
mantelli, 861.
owenni, 861.
Aquila
adalberti, 864, 865.
albicans, 865.
bifasciata, 503, 504, 620, 621, 622, 863, 865.
bonellii, 75, 76.
clanga, 864.
crassipes, 503, 504, 620, 621, 622, 865.
fulvescens, 68, 69, 70, 73, 74, 865.
fusca, 865.
hastata, 69, 70, 71, 74, 622, 864, 865.
imperialis, 74, 75, 502, 620, 621.
Aquila
leucolena, 864.
mogilnik, 863, 865.
nævia, 71, 73, 74, 75, 622, 623, 864, 865.
nævioides, 69, 70, 75, 864, 865.
nipalensis, 503.
orientalis, 864, 865.
pennata, 74, 411.
vindhiana, 865.
vittata, 864, 865.
Arachnechthra
asiatica, 434.
lotenia, 434.
Araneus
formicinus, 309, 310.
Arctocephalus
antarctica, 661.
antarcticus, 655.
californianus, 737.
cinerea, 654.
cinereus, 653, 654, 655, 657, 659, 660, 661, 743.
falklandica, 661.
forsteri, 654, 657.
monteriensis, 737.
nigrescens, 655, 656, 659, 661.
Arctophoca
argentata, 661.
cinerea, 743.
philippii, 660, 661, 737.
Ardea
cinerea, 477.
intermedia, 477.
lepida, 89, 105.
purpurea, 477.
sacra, 87, 89, 104.
sinensis, 89, 105.
Ardeola
grayii, 478.
leucoptera, 478.
Ardetta
cinnamomea, 478.
flavicollis, 478.
sinensis, 478.
Argiope
epeiroides, 301, 349.
sericea, 301, 349.
giganteus, 729.
Argyrodes
epeiræ, 279, 280, 301, 348.
syriaca, 215, 279, 301, 348, 352.
Ariadne
flagellum, 278.
insidiatrix, 223, 347.

Ariamne
longicaudata, 215, 277, 278, 348, 352.
Arrenga
blighi, 405, 444.
cyanea, 444.
Artamus
fuscus, 440.
leucorhynchus, 89, 99.
Ascalapha
bengalensis, 81.
coromanda, 81.
Asterias
mollis, 812.
scaber, 812.
Astur
trivirgatus, 410.
Ateles
albifrons, 4.
ater, 5, 9, 688.
beelzebuth, 688.
belzebuth, 5.
fusciceps, 664.
geoffroii, 4.
melanochir, 4, 9, 797, 798.
ornatus, 4.
rufiventris, 688.
variegatus, 4, 728.
vellerosus, 5, 9, 688, 797, 798.
Athene
brama, 81.
castaneonota, 405, 408, 418.
castanoptera, 418.
Athyma
selenophora, 564.
zeroca, 564.
Attagen
aquilus, 482.
ariel, 482.
minor, 406, 482.
Atticora
cyanoleuca, 825, 826, 844, 845.
Attus
æruginosus, 322.
candidus, 337.
canescens, 338.
conveniens, 338.
gambosus, 336.
mustellatus, 322.
ostrinus, 329.
Atys
(Alicula) *isseli*, 11, 15.
Axinæa
fringilla, 612, 614.
Azema
smithii, 854, 856, 857.

Barbastellus
communis, 703, 704.
Barbus
beavani, 875, 876, 877.
Bassaris
astuta, 2.
Batagur
pictus, 588.
Batrachostomus
moniliger, 406, 420.
Baza
lophotes, 415.
Belenois
abyssinica, 58.
affinis, 57.
augusta, 55.
boisduvaliana, 57.
calypso, 53.
charina, 54.
clytie, 56.
confusa, 55.
creona, 56.
cynis, 55.
erastus, 57.
eudoxia, 55.
gidica, 55.
hedyle, 53.
helcida, 53.
hyoma, 55.
ianthe, 53.
inana, 54.
javæ, 56.
larima, 54.
matuta, 54.
meldolæ, 54.
mentes, 57.
mesentina, 55.
niscia, 56.
orbona, 54.
periclea, 57.
perictione, 56.
perimale, 57.
peristhene, 57.
phaola, 54.
pigea, 54.
pitys, 57.
rachel, 57.
rhena, 53.
sabina, 53.
scyllaria, 56.
simana, 54.
sylvia, 55.
syrinx, 56.
teutonia, 55.
theora, 53.
thysa, 53.
zochalia, 55.
Bernicla
antarctica, 366.
chiloënsis, 366.
dispar, 366.
inornata, 366.
magellanica, 366, 549.
melanoptera, 365.
poliocephala, 366, 549.
Bizone
gazella, 572, 582.
Bourciera
fraseri, 687.
heliciniformis, 687.
Brachypternus
aurantius, 428.
ceylonus, 405, 428.
puncticollis, 428.
Brachypteryx
palliseri, 405, 408, 443.
Branta
rufina, 480.
Bronchocela
cristatella, 589.
jubata, 589.
Bubo
virginianus, 536, 549.
Buccinum
areola, 837.
saburon, 837.
Buceros
rhinoceros, 636.
Buchanga
cærulescens, 439.
leucopygialis, 405, 439.
longicaudata, 438.
macrocerca, 438.
minor, 405, 438.
Budytes
viridis, 458.
Bufo
asper, 591.
biporcatus, 591.
cruentatus, 598.
divergens, 591.
leptopus, 591, 598.
melanostictus, 591.
viridis, 402.
Bulacca
ocellata, 80.
Bulimus
angasiana, 808.
anthinanensis, 687.
baconi, 808.
bifulguratus, 687.
bivaricosus, 19.
bourcieri, 687.
cardinalis, 687.
catlowia, 687.
chimborasensis, 687.
coloratus, 687.
cotopaxiensis, 687.

Bulimus
cuneus, 687.
du burghei, 687.
expansus, 687.
fallax, 687.
felix, 687.
floccosus, 687.
fraseri, 687.
fucatus, 687.
fungairinoi, 687.
fusoides, 687.
gallina-sultana, 687.
guerinii, 687.
guttulata, 687.
hartwegi, 687.
irroratus, 687.
jacksonensis, 807.
mastersi, 808.
membrilinus, 687.
murrinus, 687.
peelii, 687.
piperitus, 687.
putus, 516.
quitensis, 687.
riparius, 687.
sachsei, 687.
saturnus, 687.
taylorianus, 687.
thompsoni, 687.
(Charis) *krefftii*, 19, 23.
(Chondrula) *adelaidæ*, 807.
(Harpalus) *khasianus*, 516, 518.
(——) *munipurensis*, 516, 518.
(Liparus) *braxieri*, 807.
(Napæus) *adelaidæ*, 807.
(Placostylus) *cuniculinsulæ*, 19, 23.
Bungarus
annularis, 591.
flaviceps, 591.
Buphus
coromandus, 477.
Butalis
grisola, 441.
muttui, 441.
Buteo
desertorum, 413.
erythronotus, 536, 540.
ferox, 74, 78.
vulgaris, 79.
Butorides
javanica, 478.
virescens, 652.

Cadulus
minutus, 10, 15.
Cæcum
costulatum, 799.
vitiense, 799.
Cairina
moschata, 367, 370.
Calamaria
agamensis, 589.
articeps, 589.
benjaminsii, 590.
bicolor, 589.
borneensis, 589.
flaviceps, 589.
gracillima, 594, 600.
martapurensis, 590.
nigro-alba, 589.
rælandti, 589.
schlegelii, 589.
temminckii, 589.
Calandria
blanca, 537, 539, 540, 541.
Caligula
cachara, 578.
Callerebia
annada, 556.
arixa, 555.
Callipepla
gambelli, 795.
Callophis
bivirgatus, 591.
intestinalis, 591.
Callorhinus
ursinus, 658.
Calobates
sulphurea, 458.
Calohyla
sundana, 591.
Calophrynus
pleurostigma, 591.
punctatus, 591.
Calornis
corvina, 100.
kittlitzi, 87, 88, 89, 100.
Calotes
jerdoni, 382.
maria, 382.
mystaceus, 382.
versicolor, 381.
Calotragus
spiniger, 641.
Calpenia
saundersi, 571, 582.
Campephaga
melæna, 99.
monacha, 89, 99.
morio, 99.
nesiotis, 89, 98.
Canirallus
griseofrons, 868.
hioloides, 869.
Canis
quao, 720.
sumatrensis, 720.
Capra
perpusilla, 638, 639, 641.
picta, 689.
pygmæa, 638, 641.
Caprimulgus
asiaticus, 421, 422.
atripennis, 421.
enarratus, 867.
griseatus, 93.
jotaka, 92.
kelaarti, 421.
mahrattensis, 421.
manillensis, 93.
phalæna, 89, 91, 92.
stictomus, 92.
Caranx
trachurus, 834, 836.
Carbo
melanoleucus, 90, 114.
Cardita
raouli, 613, 614.
Cardium
(Ctenocardia) *victor*, 612, 614.
Carocolla
novæ-hollandiæ, 805.
Carpophaga
oceanica, 89, 101.
pacifica, 101.
pusilla, 466.
sylvatica, 466.
Cassidea
areola, 837.
saburon, 837.
Cassis
achatina, 838.
arcola, 837.
coronulata, 838.
glauca, 838.
nivea, 616.
paucirugus, 838.
pila, 837.
pyrum, 838.
saburon, 837.
sophia, 617.
sophiæ, 838.
torquata, 838.
zeylanica, 838.
Castalia
cordata, 687.
Castor
canadensis, 804.
Casuarius
australis, 150.
bennetti, 149, 150.

Casuarius
bicarunculatus, 150, 495.
galeatus, 150, 495.
kaupi, 147, 148, 149, 150.
papuensis, 149, 150.
uniappendiculatus, 147, 149, 150.
Cathæmia
anthyparete, 32.
xantholeuca, 37.
Cathartes
atratus, 536.
Catophaga
buniæ, 42.
cheiranthi, 65.
josephinæ, 41.
leis, 44.
Cebus
hypoleucus, 4, 9.
leucocephalus, 4.
Cemoria
nana, 10, 15.
Centropus
chlororhynchos, 405.
chlororhynchus, 433.
phasianus, 603.
rufipennis, 433.
Ceratorhinus
crossii, 794.
Cerberus
acutus, 590.
rhynchops, 590.
Ceriornis
blythii, 496.
caboti, 496.
melanocephalus, 496.
satyra, 496, 730, 734, 736.
Certhiola
martinicana, 649.
Cerva
parvula, 641.
Cervulus
reevesi, 813, 814, 815.
sclateri, 814.
vaginalis, 813.
Cervus
alfredi, 24.
eldi, 798.
griseus, 639.
guineensis, 638, 639, 640.
mantchuricus, 794.
mexicanus, 690.
pseudaxis, 794.
—— (*taivanus*), 815.
pudu, 522.
savannarum, 690.
Cervus
schomburgki, 798.
sika, 794, 798.
taëvanus, 794.
virginianus, 690.
(Rucervus) *schomburgki*, 798.
Ceryle
alcyon, 652.
rudis, 424.
Cethosia
mahratta, 556.
nietneri, 557.
Ceyx
tridactylus, 424.
Chalcophaps
indica, 467.
Chalcopsitta
scintillata, 862.
Chamæpelia
passerina, 653.
trochila, 653.
Charadrius
cantianus, 89.
fulvus, 89, 104, 470.
geoffroyi, 89.
longipes, 470.
pluvialis, 104.
Charasia
dorsalis, 382.
Chasmorhynchus
niveus, 734.
Chauna
chavaria, 603.
derbiana, 603.
Cheiracanthium
anceps, 255, 348, 354.
annulipes, 254, 348, 354.
mildea, 348.
mildei, 255.
nutrix, 256.
pelasgicum, 256, 348.
scidlitzii, 255, 348.
tenuissimum, 255, 348.
Cheirogaleus
major, 850, 851.
milii, 854, 855.
smithii, 857.
typicus, 854, 855, 856.
Chelonia
imbricata, 588.
Chelura
glacialis, 570.
Chelymys
krefftii, 508.
macquaria, 506, 509.
victoriæ, 505, 506, 507.
Chersina
angulata, 184.
Chersinella
geometrica, 616.
leithii, 616.
marginata, 616.
semisulcata, 616.
sulcata, 616.
tentoria, 616.
verrouxii, 616.
Chersydrus
granulatus, 396.
Chettusia
gregaria, 471.
Chilo
bivittellus, 581, 583.
cervinellus, 581, 583.
inconspicuellus, 582, 583.
interruptellus, 581, 583.
Chloëphaga
melanoptera, 365.
Choanites
kœnigii, 125.
Cholopus
didactylus, 861.
hoffmanni, 861.
Chroicocephalus
ichthyaëtus, 480.
Chrysemis
oregonensis, 873.
Chrysemys
belli, 873.
bellii, 873.
picta, 873.
Chrysocolaptes
festivus, 427.
goensis, 427.
stricklandi, 405, 408, 427, 429.
Chrysopelea
ornata, 590.
rubescens, 590.
Chrysophlegma
chlorophanes, 428.
Chrysothrix
sciurea, 3.
Ciconia
episcopus, 477.
leucocephala, 477.
Cinclocerthia
macrorhyncha, 648.
Ciniflo
puta, 262.
Circaëtus
gallicus, 77, 863.
Circus
æruginosus, 78, 414.

Circus
cinereaceus, 413.
cinereus, 536.
cyaneus, 78.
melanoleucos, 414.
swainsoni, 78.
swainsonii, 413.
Cirrochroa
lanka, 557.
mithila, 558.
thais, 557.
Cissa
ornata, 405, 406, 408, 461.
puella, 461.
Cisticola
cursitans, 455.
homalura, 455, 466.
schœnicola, 455, 456.
Cithæron
prædonium, 273, 348.
Clathurella
pulcherrima, 14, 15.
rubro-guttata, 14, 15.
Clausilia
(Nenia) *buckleyi*, 686, 687.
Clemmys
leprosa, 603.
Clotho
limbata, 222, 347.
septempunctata, 222, 347.
Clubiona
accentuata, 254, 348.
contaminata, 254, 348, 354.
deinognatha, 252.
gilva, 253, 348, 354.
phragmitis, 252, 253, 254.
straminea, 252, 253, 348, 354.
Clupea
harengus, 834.
pilchardus, 834.
Cnipolegus
aterrimus, 542.
cyaneirostris, 542.
hudsoni, 541, 542, 548, 549.
Coassus
rufus, 522.
Coccystes
coromandus, 432.
jacobinus, 432.
melanoleucos, 432.
Coccyzus
americanus, 496, 681.
bairdi, 496.
erythrophthalmus, 681.
Coccyzus
minor, 651.
Colaptes
agricola, 549.
Colias
andrea, 48.
ernestius, 56.
Collocalia
fuciphaga, 420.
vanicorensis, 89.
sp. ?, 93.
Colossochelys
atlas, 139.
Columba
intermedia, 69, 467.
macerona, 466.
macroura, 466.
maculosa, 545, 549.
oceanica, 101.
picazuro, 545.
Compsosoma
hodgsoni, 393.
melanurum, 590.
radiatum, 590.
Conger
vulgaris, 834.
Conurus
patachonicus, 607.
patagonus, 549.
Copsychus
albospecularis, 866.
saularis, 453.
Coracias
indica, 423.
Corethrura
insularis, 869.
Coronella
cana, 837.
phocarum, 795, 837.
Corvus
culminatus, 460.
frugilegus, 645.
levaillanti, 460.
splendens, 460.
Corydalla
richardi, 458.
rufula, 458.
striolata, 458.
Crax
carunculata, 636.
daubentoni, 690.
incommoda, 690.
Creatonotus
rubricosta, 573.
Criniger
ictericus, 450.
Crocodilus
biporcatus, 588.
palustris, 588.
Crocopus
chlorogaster, 465.
Crossochilus
barbatulus, 152.
Crotophaga
ani, 651.
Ctenomys
brasiliensis, 536.
Ctenophora
monticola, 215, 287, 349.
Ctenus
syriacus, 320, 350.
Cuculus
bartletti, 431.
canorus, 89, 100, 430, 431.
fucatus, 101.
himalayanus, 100.
micropterus, 101, 430.
poliocephalus, 431.
sonneratii, 430, 431.
striatus, 89, 100.
telephonus, 100.
tenuirostris, 101, 431.
xanthorhynchos, 432.
Cuon
alpinus, 719, 720.
dukhunensis, 715, 719.
primævus, 719, 721.
sumatrensis, 719.
Cuora
amboinensis, 372.
amboynensis, 616.
borneensis, 588.
Cursorius
coromandelicus, 470.
Cyanecula
suecica, 454.
Cyanorhamphus
alpinus, 795.
auriceps, 795.
novæ-zealandiæ, 795.
Cyclemys
oldhami, 371.
ovata, 588.
Cyclophis
persicus, 392.
tricolor, 590.
Cyclotus
bogotensis, 687.
crosseanus, 687.
dunkeri, 687.
fischeri, 687.
granulatus, 687.
Cygnus
coscoroba, 365.
nigricollis, 365.
Cylichna
minuta, 11, 15.
Cylindra
nucea, 843.

Cylindrella
(Holospira) *gealei*, 12, 15.
(Urocoptis) *decurtata*, 12, 15.
Cylindrophis
rufus, 589.
Cynocephalus
niger, 222.
Cynopithecus
niger, 721, 723, 724.
nigrescens, 723.
Cynopterus
horsfieldii, 693.
marginatus, 693.
Cynthia
asela, 558.
erota, 558.
Cyornis
banyumas, 442.
jerdoni, 442.
rubeculoides, 442.
Cypræa
annulus, 83.
arabica, 83.
asellus, 82.
bicolor, 85.
caput-serpentis, 83.
carneola, 82.
caurica, 85.
clandestina, 84.
commixta, 84.
comptoni, 85.
controversa, 82.
coxi, 617.
cruenta, 85.
erosa, 85.
errones, 85.
felina, 82.
fimbriata, 82.
flaveola, 84.
gangrænosa, 84.
helvola, 84.
hirundo, 82.
hordacea, 86.
humphreysii, 84.
interstincta, 86.
isabella, 82.
limacina, 86.
lutea, 84.
lynx, 83.
macula, 82.
miliaris, 85.
moneta, 83.
moniliaris, 84.
olivacea, 85.
piperata, 85.
posaria, 84.
scurra, 83.
spurca, 84.
squalina, 83.
Cypræa
staphylæa, 86.
subviridis, 84.
tabescens, 83.
ursellus, 82.
vanelli, 83.
variolaria, 85.
vitellus, 83.
xanthodon, 84.
Cypræovula
umbilicata, 85.
Cyprinus
calbasu, 876.
cephalus, 834.
chagunio, 875, 876.
dero, 876.
Cypselus
affinis, 419.
apus, 17, 356.
batassiensis, 420.
gracilis, 868.
melba, 419.
pallidus, 356.
Cyrtodactylus
yarkandensis, 381.
Cytherea
(Gomphina) *moerchi*, 611, 614.

Dacelo
gigas, 671.
Dafila
acuta, 479.
bahamensis, 367, 370.
fulva, 370.
spinicauda, 367, 370.
vidvata, 370.
Daptonura
ælia, 52.
eubotea, 52.
eurymnia, 52.
evonima, 53.
isandra, 52.
leucadia, 52.
leucanthe, 52.
limnoria, 52.
lycimnia, 51.
pantoporia, 52.
peruviana, 52.
polyhymnia, 51.
salacia, 52.
Dasypus
villosus, 831.
Delias
aganippe, 30.
agostina, 33.
apriate, 29.
argenthona, 31.
aruna, 34.
autothisbe, 28.
bagoe, 33.
Delias
belisama, 34.
belladonna, 30.
blanca, 33.
cæneus, 32.
candida, 35.
chrysomelæna, 35.
chrysorrhœa, 29.
crithoë, 29.
cruentata, 32.
descombesi, 34.
dice, 33.
dorimene, 35.
dorylæa, 35.
duris, 33.
echidna, 35.
echo, 34.
egialea, 29.
eucharis, 28, 32.
eunia, 33.
fragalactea, 31.
furvus, 36.
gabia, 33.
georgina, 36.
glauce, 34.
hæmorrhœa, 31.
harpalyce, 36.
henningia, 30.
herodias, 35.
hierte, 31, 32.
hippodamia, 35.
horsfieldii, 30.
hyparete, 31.
indica, 31.
inferna, 34.
isse, 34.
ithiela, 30.
lorquinii, 31.
lucerna, 30.
luzoniensis, 31.
momea, 36.
myois, 32.
nigrina, 36.
ninus, 29.
nysa, 36.
ochreopicta, 30.
orphne, 36.
pandemia, 30.
parthenope, 29.
pasithoë, 29.
peribœa, 33.
philotis, 32.
pœcilea, 35.
pyramus, 29.
rosenbergii, 31.
sanaca, 30.
singhasura, 33.
sthenobœa, 34.
stollii, 32.
themis, 33.
thysbe, 29.

Delias
timorensis, 35.
tyche, 29.
zebuda, 34.
Delphinus
longirostris, 586.
Demiegretta
asha, 477.
Dendrochelidon
coronatus, 420.
Dendrocitta
sinensis, 862.
Dendrocygna
arcuata, 479.
fulva, 367.
javanica, 479, 480.
viduata, 367.
Dendrœca
adelaidæ, 649.
Dendrophila
frontalis, 435.
Dendrophis
caudolineata, 590.
dumerilii, 590.
formosa, 590.
picta, 590.
Dermatochelys
coriacea, 588.
Deroca
maculata, 575.
Dibaphus
edentulus, 843.
Dicæum
minimum, 434.
Dictyna
benigna, 261, 262, 348.
consecuta, 261, 262, 348.
innocens, 262, 348.
puta, 261, 348.
uncinata, 261.
variabilis, 261, 348.
Dilophyrus
grandis, 589.
Dinornis
crassus, 605.
gravis, 605.
Diplommatina
concinna, 13, 15.
Dipsas
boops, 591.
cynodon, 590.
dendrophila, 590.
multimaculata, 591.
Dissemurus
edoliiformis, 439.
lophorhinus, 405, 439.
malabaricus, 439.
Diuca
cinerea, 550.
Diuca
minor, 537, 540, 548, 549, 550.
Dolomedes
consocius, 320, 350.
mirabilis, 321.
Domicella
rubiginosa, 88.
Dorvillia
agariciformis, 117.
Draco
cornutus, 589.
cristatellus, 589, 592, 600.
fimbriatus, 589.
hæmatopogon, 589.
spilopterus, 592, 600.
volans, 589.
Drassus
clavator, 232.
dalmatensis, 235, 347.
infumatus, 238, 347, 353.
invalidus, 237, 347, 353.
lacertosus, 235, 347, 353.
lapidicolens, 232, 235, 236, 237, 238, 239, 347.
lutescens, 233, 347.
morosus, 232, 237, 347, 353.
mundulus, 234, 236, 347, 353.
nanus, 237, 347, 353.
omissus, 239, 347, 353.
scrutatus, 239, 347, 353.
senilis, 236, 347, 353.
sericeus, 234, 236.
tenerrimus, 233, 347, 353.
troglodytes, 232, 347.
unicolor, 240, 347, 353.
(Micaria) *nitens*, 250.
Dromas
ardeola, 472.
Dromornis
australis, 682.
Drymocataphus
fuscicapillus, 447.
fuscocapillus, 405.
Drymoipus
inornatus, 456, 457.
jerdoni, 456.
longicaudatus, 457.
robustus, 457.
validus, 405, 457.
Dudusa
sphingiformis, 577, 583.
Dumetia
albogularis, 447.
Dysdera
erythrina, 223, 224.
rubicunda, 223.
westringii, 223, 347, 351.
Dysidea
fragilis, 124.
Dysporus
piscator, 90.
sula, 90.

Edolius
paradiseus, 439.
Elainea
martinica, 650.
Elanoides
furcatus, 626.
Elanus
melanopterus, 80, 415.
Elaps
tetratænia, 591.
Elseya
dentata, 512, 513.
intermedia, 512.
latisternum, 509, 510, 511, 512, 514.
spinosa, 512.
Emarginula
modesta, 10, 15.
rugosa, 10, 15.
Emberiza
citrinella, 681.
Embernagra
platensis, 548.
Emydura
macquaria, 506.
Emys
bellii, 873.
crassicollis, 588.
flavipes, 603.
macquaria, 504.
nigra, 873.
olivacea, 873.
oregonensis, 873.
speciosa, 873.
spengleri, 588.
Enhydrina
valacadyen, 401.
Enicognathus
javanicus, 590.
Ennea
blanfordiana, 515, 518.
stenopylis, 516, 518.
vara, 516, 518.
Envo
atriceps, 271, 272, 348.

Enyo
germanica, 270.
græca, 270, 348.
luctuosa, 270, 271, 348.
lutipes, 272, 348.
Epeïra
adianta, 300, 349.
antriada, 300, 349.
apoclisa, 349, 300.
calva, 298.
circe, 301, 349.
conica, 299.
cucurbitina, 299, 349.
diversa, 285.
herii, 298, 349.
incongrua, 299, 349.
inconveniens, 298, 349.
lucina, 299, 349.
neta, 298, 349.
oculata, 299.
opuntiæ, 278, 279, 280, 301, 349.
perplicata, 300, 349.
similis, 298.
solers, 300, 301, 349.
trifasciata, 298.
Ephialtes
bakkamuna, 417.
lempigi, 417.
pennatus, 418.
sunia, 418.
Epicrium
glutinosum, 404, 591.
monochroum, 591.
Epidromus
brazieri, 22.
Epomophorus
gambianus, 364.
macrocephalus, 364.
Eremias
cæruleo-ocellata, 373.
variabilis, 374.
Eresus
acanthophilus, 260, 348.
mœrens, 261, 348.
ruficapillus, 261, 348.
Erigone
alexandrina, 747.
blackwallii, 765, 769.
cucullata, 767.
dentata, 290, 349.
—, var. *orientalis*, 290.
dentipalpis, 291, 349.
—, var. *syriaca*, 291.
femoralis, 291, 349.
incauta, 289, 349.
inexpedibilis, 289, 349.
insecta, 755.
longipalpis, 285, 292.
pastoralis, 292, 349.
Erigone
pavida, 293, 349.
prominula, 747.
rurestris, 289, 290, 349.
scabricula, 753.
spinosa, 292, 349, 352.
sundevallii, 749.
(Neriene) *alexandrina*, 755, 768, 769.
(——) *avietans*, 748.
(——) *digitata*, 758, 768, 769.
(——) *forensis*, 749.
(——) *incompta*, 748.
(——) *inconspicua*, 751.
(——) *prominula*, 750.
(——) *romana*, 752.
(——) *sarcinata*, 757, 768, 769.
(——) *sila*, 753.
(Walckenaëra), 752.
(——) *alpina*, 767, 768, 769.
(——) *biscissa*, 754, 768, 769.
(——) *blackwallii*, 765, 768.
(——) *cito*, 764, 768, 769.
(——) *elegans*, 766, 768, 769.
(——) *græca*, 755, 768, 769.
(——) *kochii*, 759, 768, 769.
(——) *monodon*, 759, 768, 769.
(——) *pallens*, 753.
(——) *prægracilis*, 762, 768, 769.
(——) *saltuensis*, 763, 768, 769.
(——) *scurrilis*, 760, 768, 769.
(——) *similis*, 761, 768, 769.
(——) *simonii*, 756, 768, 769.
Eriodes
frontatus, 4.
Erismatura
ferruginea, 368, 370, 549.
Ero
tuberculata, 287, 349.
Eronia
pingasa, 565.
Errina
fissurata, 745, 747.
Erythrosterna
hyperythra, 405, 409, 442, 443.
leucura, 443.
parva, 442.
Esacus
recurvirostris, 472.
Estrelda
amandava, 464.
Eublepharis
fasciatus, 380.
hardwickii, 380.
macularius, 379, 380.
Euchelymys
spinosa, 510, 512.
sulcifera, 509.
Eudromia
elegans, 545, 549.
Eudynamis
honorata, 432.
orientalis, 432.
Eulabes
ptilogenys, 405, 463.
religiosa, 463.
Eulampis
holosericus, 651.
jugularis, 651.
Eulima
porcellana, 15.
Eumeces
ladacensis, 375.
Eumetopias
stelleri, 737, 738, 739, 740, 741.
Eumyias
ceylonensis, 442.
melanops, 442.
sordida, 405, 441.
Euoticus
pallida, 860.
pallidus, 860.
Euplocamus
swinhoii, 550.
Eupodotis
caffra, 603.
denhami, 603.
ruficollis, 603.
Euprepes
belcheri, 589.
ceramensis, 589.
olivaceus, 589.
percarinatus, 588.
rufescens, 588.
Eurostus
heteraspis, 590.
Eurylaimus
nasutus, 674, 675, 676.
Eurystomus
orientalis, 423.
Eusemia
albomarginata, 569.

Eusemia
funebris, 569.
Euterpe
calymnia, 59.
corcyra, 58.
leucadia, 52.
notha, 58.
pieridoides, 58.
Eutolmaëtus
bonellii, 75, 623.
Excalfactoria
chinensis, 470.

Falcinellus
igneus, 479.
Falco
barbarus, 356.
jugger, 626.
peregrinator, 410.
peregrinus, 88, 89, 90, 410.
polyagrus, 626.
sparverius, 536.
Fannyella
rossii, 745, 747.
Felis
concolor, 826.
geoffroyi, 203.
onca, 826.
pardinoides, 203.
pardus, 817.
tigris, 817.
Fiber
zibethicus, 804.
Filistata
albimaculata, 216, 347, 351.
attalica, 216, 217, 347.
hirsuta, 217, 347.
nana, 217.
Fordonia
unicolor, 590.
Fossa
d'aubentonii, 869, 872.
Francolinus
pictus, 469.
Fuligula
cristata, 90.

Gadus
luscus, 834.
Galago
allenii, 857.
crassicaudatus, 860.
demidoffii, 858.
gabonensis, 860.
garnetti, 689.
garnettii, 860.
maholi, 859.
monteiri, 860.
Galago
otolicnus, 860.
senegalensis, 859.
sennariensis, 859.
Gallicrex
cristatus, 475.
Gallinago
gallinula, 473.
nemoricola, 473.
scolopacina, 473.
stenura, 473.
Gallinula
chloropus, 475.
euryzona, 106.
phœnicura, 476.
Galloperdix
bicalcarata, 405, 469.
Gallus
bankiva, 89, 103.
stanleyi, 405, 468.
Garrulax
cinereifrons, 405, 448.
moniliger, 554.
picticollis, 554.
Gavialis
schlegelii, 588.
Gazella
bennettii, 601.
dama, 601.
cuchore, 601.
granti, 602.
mohr, 601.
picticauda, 601.
sœmmerringii, 601, 602.
Gecinus
sharpei, 153.
vaillantii, 153, 154.
viridis, 153.
Gecko
albofasciolatus, 589.
monarchus, 589.
smithii, 589.
Gelochelidon
anglica, 480.
Genetta
fossa, 872.
Geocichla
citrina, 445.
cyanota, 445.
layardi, 405, 445.
rubecula, 445.
Geodia
barretti, 198, 202.
m'andrewii, 196, 201, 202.
tuberculosa, 626, 634.
tumulosa, 628, 634.
Geoemyda
spinosa, 140, 588.
Geometra
alboviridis, 581, 583.
lineata, 580, 583.
Georychus
hottentottus, 364.
Geositta
cunicularia, 825.
Geotrochus
fergusoni, 614.
turris, 614.
Geranoëtus
melanoleucus, 536, 549.
Gerbillus
indicus, 69.
Gervaisia
albospecularis, 866.
Glandina
dactylus, 687.
saccata, 687.
Glaucidium
nanum, 536, 549, 550.
Gnaphosa
cambridgii, 227, 228, 229, 347, 351, 353.
conspersa, 230, 347, 353.
excerpta, 226, 347, 353.
exornata, 224, 226.
kochii, 229, 230, 347, 353.
lutata, 228, 229, 347, 353.
palæstina, 231, 347, 353.
plumalis, 225, 347, 353.
ripariensis, 224, 225, 347, 353.
Goisachius
melanolophus, 406, 478.
Gongylus
ocellatus, 377.
Gonyocephalus
chamæleontinus, 589.
doriæ, 589.
Gonyosoma
dorsale, 395.
margaritatum, 590.
oxycephalum, 590.
Graculus
javanicus, 483.
layardi, 437.
macei, 437, 438.
pusillus, 437.
sinensis, 483.
Grapta
agnicula, 559.
c-album, 559.
Gubernatrix
cristatella, 537, 540, 548.

Gygis
alba, 89, 90, 114.
Gymnodactylus
consobrinus, 589.
khasiensis, 379.
marmoratus, 589.
Gyps
bengalensis, 77.
Gypsophoca
cinerea, 654.
tropicalis, 653, 659, 660, 661.

Hæmatopus
ostralegus, 472.
Hæmatornis
cheela, 412.
Halcyon
albicilla, 89, 93.
atricapilla, 424.
capensis, 423.
cassini, 94.
chloris, 89, 93, 94.
fusca, 424.
leucocephala, 423.
pileata, 424.
reichenbachi, 89.
sacra, 94.
sanctus, 89.
smyrnensis, 424.
Haliaëtus
albicilla, 77, 78.
brooksii, 78.
leucoryphus, 76, 77, 78.
pelagicus, 78.
(Cuncuma) *leucogaster*, 412.
Haliastur
indus, 68, 79, 414.
Halispongia
choanoides, 123, 129.
Halys
himalayanus, 401.
pallasi, 401.
Hamadryas
claps, 591.
Hapale
geoffroii, 8.
œdipus, 8.
Hapalemur
griseus, 851, 852.
Harpactes
fasciatus, 422, 448.
Harpalus
grateloupi, 517.
guineensis, 517.
munipurensis, 517.
Harpyhaliaëtus
coronatus, 536, 549.
Harpyiocephalus
huttonii, 711.
Hecaërge
maculata, 257, 348.
opiniosa, 258, 348, 354.
Helicarion
croceus, 518.
gigas, 517, 518.
(Hoplites) *croceus*, 517.
(——) *solidus*, 518.
(——) *theobaldi*, 517.
Helichroma
idiotica, 39.
Heliophanus
melinus, 346.
Helix
æquatoria, 687.
æquatoriana, 687.
bellengerensis, 805.
biocheana, 805.
bituberculata, 687.
blomfieldi, 18, 19.
cerata, 806.
cerea, 806.
clarencensis, 807.
coxi, 18, 806.
cyclostomata, 19.
dupuyana, 805, 806.
farrisi, 687.
flora, 687.
forbesii, 806.
furcillata, 687.
gaertneriana, 805.
graftonensis, 807.
leptogramma, 618.
leucocheilus, 805.
louisiadensis, 611.
mendana, 21, 23.
meta, 805.
metula, 805.
migratoria, 20.
millicentæ, 611.
moreletiana, 687.
morti, 618.
pachystyla, 610.
philomela, 611.
scalenostoma, 687.
splendescens, 21.
stenostrepta, 687.
subrugata, 807.
turriculata, 806.
villandrei, 805.
wilcoxi, 806.
(Aglaia) *macasi*, 686, 687.
(Callicochlias) *coxi*, 806.
Helix
(Camæna) *mulgravensis*, 21.
(Charopa) *midsoni*, 806.
(——) *milligani*, 807.
(——) *scrupulus*, 807.
(Conulus) *liardeti*, 618.
(——) *umbraculorum*, 806.
(Discus) *atkinsoni*, 806.
(Galaxias) *liverpoolensis*, 618.
(Geotrochus) *adonis*, 805.
(——) *brodiei*, 20, 23.
(——) *choiseulensis*, 21, 23.
(——) *dupuyana*, 806.
(——) *hermione*, 805.
(——) *leucophæa*, 20, 23.
(——) *mendoza*, 21.
(——) *philomela*, 610, 614.
(Hadra) *parsoni*, 18, 23.
(Helicostyla) *croftoni*, 18, 23.
(Merope) *novæ-hollandiæ*, 805.
(Microcystis) *catletti*, 617.
(Rhyssota) *subrugata*, 807.
(Rhytida) *boydi*, 805.
(——) *villandrei*, 805.
(Trachia) *dryanderensis*, 19.
(Videna) *bellengenensis*, 805.
(——) *milligani*, 807.
(Xanthomelon) *lyndi*, 610, 614.
(Zonites) *gawleri*, 618.
Hemidactylus
brookii, 589.
frenatus, 589.
meyeri, 594.
persicus, 378.
trihedrus, 379.
variegatus, 589.
vittatus, 589.
zosterophorus, 589.
Hemipus
picatus, 437.
Herodias
alba, 477.
egrettoides, 477.
garzetta, 477, 478.

Herpœnia
eriphia, 67.
Hersilia
caudata, 276.
indica, 276.
oraniensis, 276.
Hersiliada
simonii, 275, 348, 352.
Hesperocharis
anguitia, 39.
avivolans, 38.
catogramma, 38.
costaricensis, 38.
crocea, 39.
erota, 38.
fulvinota, 40.
gayi, 39.
graphites, 38.
helvia, 39.
hirlanda, 39.
idiotica, 39.
lenoris, 39.
leucania, 39.
marchalii, 38.
nera, 39.
nereis, 39.
Heteralocha
gouldi, 643, 645.
Heteronota
kendallii, 589.
Heteropoda
kochii, 312, 350, 352.
Hiaticula
leschenaultii, 471.
Hierococcyx
varius, 431.
Himantopus
autumnalis, 474.
candidus, 475.
Hinulia
nævia, 588.
Hiposcritia
pandione, 50.
Hippopotamus
amphibius, 185, 194, 795, 821, 862.
Hipposideros
armiger, 700, 702.
nobilis, 702.
speoris, 702, 703.
Hirundo
daurica, 419.
domestica, 606.
domicola, 418.
erythropygia, 419.
gutturalis, 418.
hyperythra, 406, 419.
leucorrhoa, 606, 844, 845.
rustica, 418.
Homalopsis
buccata, 590.
doriæ, 590.
Homopus
areolatus, 184.
Homorus
gutturalis, 545, 548, 549.
unirufus, 545.
Hookerella
pulchella, 746, 747.
Huhua
nipalensis, 416, 417.
orientalis, 416, 417.
pectoralis, 416, 417.
Humphreyia
coxi, 22, 23.
strangei, 22.
Hydraspis
australis, 506.
macquaria, 506.
victoriæ, 506.
Hydrocena
milium, 515, 518.
Hydrochelidon
indica, 480.
leucopareia, 480.
Hydrocissa
coronata, 425.
Hydrophasianus
chirurgus, 475.
Hydrophis
brookii, 591, 597.
cantoris, 398.
carinata, 597.
chloris, 396.
crassicollis, 399.
gracilis, 396.
jerdoni, 401.
lindsayi, 396, 397.
loreata, 591.
nigra, 399.
schistosus, 591.
spiralis, 397.
stewartii, 399.
stricticollis, 397.
viperina, 400, 401.
Hydropotes
affinis, 524.
inermis, 522, 523, 524, 815.
Hydrosaurus
cumingii, 145.
marmoratus, 107.
nuchalis, 145.
salvator, 145, 146, 372, 588.
Hyla
arborea, 403.
papillaris, 663.
punctata, 662, 663.
Hyla
rhodoporus, 662, 663.
variolosa, 662.
Hylaplesia
borbonica, 598.
brevipes, 598, 599.
Hylomanes
momotula, 678.
Hylorana
erythræa, 403, 591, 599.
jerboa, 591, 599, 600.
luctuosa, 591.
Hymeniacidon
angulata, 632, 634.
celata, 633.
pulvinatus, 126, 127.
Hypercompa
hera, 575.
regalis, 575, 582.
Hypotriorchis
chicquera, 410.
femoralis, 536.
severus, 410.
Hypsipetes
ganeesa, 450.
neilgherriensis, 450.
Hypsirhina
plumbea, 590.
enhydris, 590.

Iacchus
rufiventer, 8.
Ibis
melanopis, 549.
nippon, 862.
Icterus
laudabilis, 649, 650.
Ictinia
mississippiensis, 626.
Idiops
syriacus, 215, 216, 347.
Imbricaria
conica, 843.
punctata, 843.
virgo, 843.
Indris
albus, 848.
brevicaudatus, 848.
variegatus, 848.
Inuus
ecaudatus, 780, 786.
maurus, 722.
rhesosimilis, 532.
rhesus, 529, 530, 531, 532, 533.
sancti-johannis, 772.
speciosus, 786.

Iora
typhia, 452.
zeylonica, 452.
Irena
puella, 452.
Ischnocolus
syriacus, 215, 347.
Ispidina
madagascariensis, 868.
picta, 666, 672, 674, 675, 676.
Ixalus
guttatus, 600.
pictus, 591.
Ixos
luteolus, 450.

Japalura
nigrilabris, 589.
Jartheza
biplagella, 582, 583.

Kelaartia
penicillata, 406, 450.
Kerivoula
formosa, 711.
pallida, 711.
Ketupa
ceylonensis, 81, 417.
Kittacincla
macrura, 453.

Labeo
diplostomus, 150, 151.
Labyrinthus
manueli, 686, 687.
Lacerta
argulus, 374.
strigata, 372.
velox, 374.
viridis, 373.
Lachesis
blackwallii, 266, 348, 351.
meadii, 265, 348, 351.
perversa, 265, 348.
Lagostomus
trichodactylus, 822, 844.
Lagothrix
infumata, 664.
Lamprococcyx
maculatus, 432.
Langia
khasiana, 568.
zenzeroides, 567.
Lanius
cristatus, 436.
erythronotus, 436.
lucionensis, 436.
superciliosus, 436.
Larus
rossi, 1.
Larvivora
cyana, 454.
Lathrodectus
argus, 288, 349.
crebus, 287, 288, 349.
hamatus, 288, 349.
pallidus, 287, 349.
Layardia
rufescens, 405, 449.
Lebadea
austenia, 560, 582.
Leila
parishii, 687.
Lemur
catta, 852.
crassicaudatus, 860.
leucomystax, 853.
macaco, 853.
milii, 855.
murinus, 857.
niger, 853.
ruber, 853.
varius, 853.
Leopardus
himalayanus, 203.
Lepilemur
dorsalis, 851.
furcifer, 855.
murinus, 857.
mustelinus, 851.
pallidicauda, 850.
ruficaudatus, 850, 851.
Leptalis
pentica, 40.
Leptasthenura
ægithaloides, 548.
Leptobrachium
gracile, 591, 598.
hasseltii, 598.
Leptoconus
(Phasmoconus) *du saveli*, 12, 15.
Leptophobia
aripa, 41.
balidia, 40.
cæsia, 40.
cinerea, 40.
eleone, 40.
elodia, 40.
euthemia, 40.
helena, 41.
olympia, 41.
pentica, 40.
philoma, 40.
pinara, 41.
pylotis, 41.
semicæsia, 40.
Leptophobia
tovaria, 41.
Leptoptilos
javanica, 477.
Lepus
ruficaudatus, 75, 77.
Lethe
dynsate, 555.
sihala, 555.
Lethia
stigmatisata, 262.
Leucocerca
albofrontata, 440.
aureola, 440.
compressirostris, 440, 441.
fuscoventris, 441.
pectoralis, 441.
Leuconia
cratægi, var. *cratægoides*, 58.
Libythea
myrrha, 556.
rama, 556.
Lichenotus
mitratus, 848.
Limnaëtus
cristatellus, 411.
nipalensis, 411.
Limnornis
curvirostris, 544.
Limonidromus
indicus, 458.
Limosa
ægocephala, 473.
Linyphia
albula, 293, 294.
albuloides, 293, 294, 349.
confusa, 294.
congener, 294, 349.
decens, 751.
frutetorum, 294, 349.
leprosa, 294, 349.
microphthalma, 751.
pratensis, 294.
Liolepis
belli, 154.
Lithosia
distorta, 572.
nigrifrons, 572.
Lobivanellus
goensis, 472.
indicus, 472.
Lophocalotes
interruptus, 593, 600.
Loriculus
chrysonotus, 790.

Loriculus
culacissi, 790.
indicus, 405, 426.
regulus, 790.
Lorius
tibialis, 718.
Loxigilla
noctis, 649.
Loxoscelis
rufescens, 277, 348.
Lutra
chinensis, 817.
swinhoii, 817.
Lycosa
albimana, 316, 350.
cambrica, 316, 317, 350.
deserta, 318, 350.
dissonans, 316, 350.
effera, 318, 350.
ejusmodi, 317, 350.
exigua, 317, 318.
fidelis, 319, 350.
grisea, 318.
monticola, 317.
nigra, 316, 350.
obscura, 317.
picta, 316, 317, 318, 319.
piratica, 316, 350.
proxima, 316, 350.
saccata, 319.
sagittata, 316, 350.
trucidatoria, 316, 350.
(Tarentula) *apuliæ*, 316, 350.
(——) *grisea*, 315, 350.
(——) *narbonnensis*, 316, 350.
Lyriocephalus
scutatus, 603.

Mabouia
parietalis, 588.
Macacus
arctoides, 203, 495, 724, 770, 771, 780, 784, 787.
assamensis, 532, 726.
brunneus, 203, 204, 207, 209, 210, 494, 495, 770, 771, 780, 784, 787.
cyclopsis, 726, 771, 772, 773, 774, 776, 777, 778, 779, 783.
erythræus, 773, 776, 779, 783.
Macacus
inornatus, 721, 722, 723, 727.
inuus, 781, 783.
lasiotis, 772.
maurus, 721, 722, 723, 724, 726, 727, 773, 781, 782, 783, 786.
melanotus, 770.
ocreatus, 723, 726, 786.
radiatus, 495, 525, 726.
rheso-similis, 495.
rhesus, 204, 495, 726, 772, 776, 777, 778.
rufescens, 204, 495.
speciosus, 204, 722, 724, 726, 770, 771, 773, 780, 781, 782, 783, 784, 786.
Macropygia
macroura, 466, 467.
Madrepora
fissurata, 744, 745.
Magus
maurus, 722.
Malacocercus
griseus, 449.
malabaricus, 406, 449.
striatus, 406, 432, 449.
terricolor, 449.
Manouria
emys, 132, 133, 136, 137, 140.
fusca, 138, 139, 140.
Mareca
chiloënsis, 368, 370.
Margarops
herminieri, 647.
montanus, 648.
Megaderma
carnatica, 712.
lyra, 712, 713.
schistacea, 712.
Megalaima
caniceps, 429.
flavifrons, 405, 429.
philippensis, 430.
zeylanica, 405, 429.
Megalophrys
montana, 591.
Megapodius
freycineti, 103.
pritchardi, 103.
senex, 89, 103.
Melania
(Hemisinus) *osculati*, 687.
Melanoides
hanleyi, 514, 518.
spinata, 514, 518.
Melanophora
carbonaria, 242, 347, 353.
carmeli, 248, 347, 354.
caucasia, 247, 347, 354.
electa, 238.
gracillima, 247, 347, 354.
helvola, 243, 347, 354.
inaurata, 246, 347, 354.
læta, 241, 242, 244, 347, 353.
pedestris, 247, 347.
picina, 242, 347, 353.
pumila, 238.
scutata, 244, 347, 354.
tragica, 243, 347, 354.
ursina, 245, 347, 354.
Meles
chinensis, 817.
leptorhynchus, 817.
Melete
limnobia, 52.
Melitea
australis, 744.
Menemerus
semilimbatus, 324.
Merops
philippinus, 422.
quinticolor, 423.
torquatus, 422.
viridis, 422.
Merula
kinnisi, 405, 446.
Metaporia
agathon, 61, 564.
ariaca, 564.
caphusa, 564.
nabellica, 61.
phryxe, 61, 564.
Metopiana
peposaca, 368, 370.
Micaria
albimana, 251, 347, 354.
ignea, 248, 347, 354.
nuptialis, 250, 251, 347, 354.
pulicaria, 250.
septempunctata, 250, 347, 354.
trifasciata, 249, 347, 354.

Microcebus
coquerellii, 857.
furcifer, 855.
Micronisus
badius, 411.
madagascariensis, 868.
Micropternus
gularis, 428.
phaioceps, 428.
Midas
elegantulus, 8.
erythrogaster, 8.
geoffroii, 8, 9.
Milionia
glauca, 570.
lativitta, 570.
zonea, 569.
Miltia
amaranthina, 218, 219, 347.
diversa, 219, 347.
Milvago
chimango, 536.
Milvulus
tyrannus, 862.
violentus, 862.
Milvus
—— ?, 623.
affinis, 79, 414.
govinda, 68, 79, 414, 623.
major, 79, 623.
melanotis, 79.
Mimus
calandria, 538, 539.
gilvus, 648.
patachonicus, 538, 548, 549.
triurus, 537, 539, 548, 549.
Minera
cunicularia, 844.
Miniopterus
blepotis, 706, 709, 714.
Mirafra
affinis, 465.
Miralia
alternans, 590.
Mirza
coquerellii, 854. 857.
Mitra
abbatis, 840.
acuminata 840.
adusta, 839.
amabilis, 841.
assimilis, 841.
aurora, 841.
brumalis, 840.
cardinalis, 839.
casta, 839.
columbellæformis, 840.
Mitra
concinna, 841.
consanguinea, 841.
coronata, 841.
crocata, 841.
cucumerina, 841.
dermestina, 840.
episcopalis, 839.
exquisita, 842.
ferruginea, 839.
flavescens, 841.
fratercula, 842.
fulva, 839.
literata, 840.
luteo-fusca, 842.
maculosa, 840.
micans, 841.
mirifica, 842.
multicostata, 841.
nivea, 839.
nodosa, 840.
pellis-serpentis, 839.
pontificalis, 839.
recurva, 842.
speciosa, 840.
testacea, 840.
tuberosa, 840.
zebrina, 842.
Mocoa
nitens, 588.
Molothrus
badius, 863.
bonariensis, 809, 862.
rufoaxillaris, 863.
Momotus
brasiliensis, 674, 675, 676.
lessoni, 666.
Monarches
godeffroyi, 87, 89, 97, 98.
Monitor
dumerilii, 588.
Mopsella
australis, 744, 747.
Morphnus
hastatus, 865.
Moschus
moschiferus, 522.
pygmæus, 639, 640, 641.
Motacilla
maderaspatensis, 458.
Munia
kelaarti, 405, 464.
malabarica, 464.
malacca, 464.
pectoralis, 464.
rubronigra, 464.
striata, 464.
undulata, 464.
Murilemur
murinus, 854, 857.
Murina
grisea, 712.
Mus
barbarus, 364.
decumanus, 818.
musculus, 364.
ningpoensis, 818.
Muscicapa
grisola, 666, 674, 675, 676.
Muscisaxicola
mentalis, 541, 549.
Mustela
sibirica, 817.
Mycetes
caraya, 6.
palliatus, 7, 9.
seniculus, 664.
villosus, 5, 6, 9.
Mycetopus
siliquosus, 687.
subsinuatus, 687.
Mycteria
australis, 477.
Myiadestes
genibarbis, 649.
Myiagra
azurea, 440.
cærulea, 440.
erythrops, 89, 97.
Myialestes
cinereocapilla, 441.
Myiarchus
erythrocercus, 650.
latirostris, 650.
Myiophonus
horsfieldi, 444.
Mylothris
agathina, 37.
agrippina, 51.
bernice, 37.
chloris, 37.
hemithea, 67.
hippomonuste, 66.
leptalina, 37.
limnoria, 52.
lorena, 38.
lypera, 37.
malenka, 38.
margarita, 50.
molpodia, 50.
monuste, 48.
orbona, 54.
pantoporia, 52.
paroreia, 37.
phileris, 37.
poppea, 36.
pyrrha, 37.
rhodope, 36.

Mylothris
trimenia, 36.
viardi, 38.
Mystacornis
crossleyi, 866.
Myzomela
rubratra, 87, 88, 89, 94.

Naja
tripudians, 591.
Nandinia
binotata, 683, 684.
Nanina
subrugata, 807.
Nannostomus
beckfordi, 146.
Nanotragus
hastatus, 642.
melanotis, 642.
montanus, 642, 874, 875.
moschatus, 642.
nigricaudatus, 875.
oreotragus, 642.
perpusillus, 641.
pygmæus, 637, 640, 641, 642, 643.
regius, 641.
scoparia, 642.
spiniger, 639, 641, 642.
tragulus, 642, 874.
Nassa
eximia, 14, 15.
Naxa
punctiella, 575.
Nectarophila
minima, 434.
zeylonica, 434.
Nectris
gama, 110.
obscura, 111.
Nemesia
cæmentaria, 216.
Neochera
tortuosa, 570, 582.
Neophasia
terlooii, 58.
Neopus
malaiensis, 411.
Neoris
shadulla, 577.
Neptis
aceris, 560, 561.
adipala, 563, 582.
amba, 563.
astola, 560, 561.
cartica, 562.
clinia, 563, 582.
columella, 562.
emodes, 561, 582.
Neptis
khasiana, 562, 582.
leucothoë, 561.
mahendra, 560, 582.
nandina, 560, 563.
ophiana, 561.
radha, 564.
soma, 563.
surakarta, 561.
susrutu, 563, 582.
varmona, 560, 561.
viraja, 563, 582.
Neriene
bituberculata, 759.
conigera, 750.
cornuta, 759.
excisa, 757, 758.
herbigrada, 289.
latebricola, 755.
livida, 291.
pallipes, 289.
pygmæa, 755.
saxatilis, 749.
subtilis, 748, 750.
(Linyphia) *oblita*, 289.
Nestor
hypopolius, 787, 788.
notabilis, 795.
Ninox
hirsuta, 418.
Nisaëtus
bonelli, 411.
Nisus
francesii, 868.
madagascariensis, 868.
Noctua
podargina, 89, 90.
Norasuma
javanica, 576, 582.
Norbea
brookii, 588.
Nothura
darwini, 547, 549.
maculosa, 547.
minor, 547.
Numenius
arquata, 474.
lineatus, 474.
phæopus, 87, 88, 89, 106, 474.
Numida
vulturina, 789.
Nyctereutes
procyonoides, 817.
Nycteridium
schneideri, 589.
Nycticejus
flaveolus, 706.
luteus, 706, 711.
Nycticorax
caledonicus, 105, 106.
goisagi, 89.
griseus, 88. 89, 105, 478.
manillensis, 89, 105.
violaceus, 652.
Nyctinomus
limbatus, 364.
Nyctipithecus
felinus, 3, 4.
lemurinus, 3, 9, 664.
oseryi, 3.
rufipes, 3, 9, 729.
trivirgatus, 3.
Nyctophilus
geoffroyi, 704.

Ochromela
nigrorufa, 441.
Ocydromus
australis, 636.
lafresnayanus, 636.
sylvestris, 636.
Odontoptera
chalybeata, 580, 583.
discospilota, 580.
Œcobius
affinis, 221, 347.
albipunctatus, 222, 347.
annulipes, 219.
domesticus, 219.
maculatus, 219, 220.
navus, 222.
teliger, 221, 222, 347, 352.
trimaculatus, 219, 221, 222, 347, 352.
Œdicnemus
crepitans, 472.
Onychoprion
anæsthetus, 482.
Oonops
punctatus, 223, 347, 352.
Ophiactis
nigrescens, 811.
Ophionereis
fasciata, 810.
Ophiops
beddomii, 375.
elegans, 374.
jerdoni, 375.
microlepis, 375.
theobaldi, 375.
Ophiothrix
cærulea, 810.
Ophiura
cylindrica, 811.

Opolemur
milii, 854.
Orca
eschrichtii, 585.
rectipinna, 585.
Oreocincla
nilgiriensis, 446.
spiloptera, 405, 446.
Oreophilus
totanirostris, 549.
Oreotragus
saltatrix, 642.
Oriolus
ceylonensis, 453.
indicus, 452.
Orthalicus
pfeifferi, 687.
(Porphyrobapha) *buckleyi*, 685, 687.
Orthorhynchus
ornatus, 651.
Orthotomus
longicauda, 455.
Ortygometra
quadristrigata, 90, 107.
Ortygornis
ponticeriana, 75, 469.
Orycteropus
capensis, 165.
Oryx
beatrix, 603, 604.
beisa, 604.
gazella, 604.
leucoryx, 604.
Osmerus
eperlanus, 834.
Osmotreron
bicincta, 465.
flavo-gularis, 465, 466.
malabarica, 465.
pompadoura, 465.
Otaria
argentata, 661.
cinerea, 654, 656, 743.
cinereus, 657.
falklandica, 661, 681.
forsteri, 654, 657.
jubata, 681.
lamarii, 657.
nigrescens, 661.
philippii, 661.
stelleri, 659, 662.
ursina, 657.
Otis
denhami, 603.
Otogale
cuoticus, 860.
pallida, 860.
Otolemur
agisymbanus, 689.
Otolicnus
gabonensis, 859, 860.
garnetti, 689.
maholi, 859.
senegalensis, 859.
sennariensis, 859.
Otostomus
loxanus, 685, 687.
Otus
brachyotus, 77, 81.
Oxylabes
madagascariensis, 866.
Oxynoë
hargravesi, 15.
Oxyopes
gentilis, 314, 315, 350.
italicus, 315.
lineatus, 314, 315, 350.
optabilis, 315, 350.
sobrinus, 314, 350.
variegatus, 315.

Pachygnatha
listeri, 294, 349.
mandibulare, 294, 349.
Pachymatisma
areolata, 630, 634.
Pachysoma
brevicaudata, 693.
diardii, 693.
duvaucellii, 693.
titthæcheilus, 693.
Paguma
larvata, 817.
Palæornis
alexandri, 425.
calthropæ, 405, 408, 426.
rosa, 425.
torquatus, 80, 425.
Palæstina
dentifera, 268, 269, 270, 348.
expolita, 269, 270, 348, 352.
sexoculata, 270, 348.
Palpimanus
hæmatinus, 260, 348.
Paludomus
cerasium, 687.
stephanus, 514.
Palumbus
elphinstonei, 466.
torringtoniæ, 405, 466.
Pampusana
rousseavi, 103.
Pandion
haliaëtus, 412.
Panolia
eldi, 813.
platyceros, 798.
Papilio
—— ?, 32.
acaste, 66.
ada, 47.
aganippe, 30.
agathina, 37.
aglaia, 29.
albomaculatus, 51.
albopictus, 30.
albunea, 49.
albusta, 66.
amaryllis, 41.
amasene, 59.
amathonte, 42.
antonoë, 31, 32.
argenthona, 31.
aspasia, 61.
augusta, 55.
aurota, 55.
belemida, 62.
belisama, 34.
belladonna, 30.
bellidice, 62.
bicolor, 34.
brassicæ, 65.
bryoniæ, 63.
cæneus, 32.
callidice, 62.
calypso, 53.
canidia, 66.
cano-exalbidus, 52.
cassida, 59.
castalia, 50.
chloridice, 62.
chloris, 37.
clytie, 56.
cneora, 48, 56.
coronea, 56.
coronis, 59.
crataegi, 58.
creona, 56.
cyane, 556.
daplidice, 62.
deiopeia, 56.
demophile, 42.
dione, 29.
discors, 32.
dorimene, 35.
drusilla, 50.
edusa, 62.
egialea, 29.
endora, 36.
epaphia, 49.
ergane, 65.
eucharis, 32.
eudoxia, 55.
evagete, 59.
flippantha, 51.

Papilio
fuliginosus, 35.
furvus, 36.
fuscofimbriatus, 50.
fusconiger, 30.
gliciria, 66.
harpalyce, 36.
hedyle, 53.
helcita, 56.
helice, 62.
hellica, 62.
hippo, 47.
hirlanda, 39.
hyparete, 31, 32.
hypatia, 49.
iphigenia, 37.
isse, 34.
javæ, 56.
judith, 61.
leucothoë, 561.
liberia, 45.
libithea, 49.
licea, 60.
liciria, 66.
lycimnia, 51.
lyncida, 48.
melania, 45.
mesentina, 55.
molphea, 42.
monuste, 66.
mysis, 32.
napææ, 63.
napi, 63.
nelo, 54.
nerissa, 59.
nero, 46.
nigricantemarginatus, 49.
nigrina, 36.
nigronervosus, 58.
nigronotatus, 53.
nysa, 36.
pamela, 38.
pasithoë, 29.
paulina, 44.
perimale, 57.
phileta, 66.
phryne, 59.
placidia, 46.
plexaris, 32.
poppa, 36.
poppea, 36.
porsenna, 29.
pyrrha, 37.
raphani, 62.
retorta, 53.
rhodope, 36.
saba, 49.
severina, 56.
sordide-flavicans, 53.
sylphia, 55.
Papilio
sylvia, 55.
teutonia, 55.
thais, 557.
thermopyle, 37.
thysbe, 29.
zelmira, 49.
zeuxippe, 59.
Papio
nigrescens, 723.
Pardalina
warwickii, 203.
Pareas
carinata, 591.
lævis, 591.
Parnassius
amathonte, 27.
apollo, 26.
cardamines, 27.
glaucippe, 27.
Parus
cinereus, 460.
Pasithea
pulchra, 314.
virescens, 314, 350.
viridis, 314.
Passer
indicus, 464.
Pastor
roseus, 462.
Pavo
cristatus, 467.
Pectunculus
montrouzieri, 613, 614.
Pelamys
bicolor, 591.
Pelargopsis
gurial, 423.
Pelecanus
philippensis, 482.
Peltastes
elongatus, 616.
forstenii, 616.
platynotus, 616.
stellatus, 616.
Pentaceros
granulosus, 812.
rugosus, 812.
Pentadactylus
borneensis, 589.
dorsalis, 589.
khasiensis, 379.
Pepoaza
murina, 541.
Perdicula
argoondah, 470.
asiatica, 470.
Pergesa
castanea, 567.
Pergesa
olivacea, 567.
Pericrocotus
flammeus, 438.
peregrinus, 438.
Periops
caudolineatus, 393.
Peripia
meyeri, 594.
Pernis
cristata, 75, 80, 414.
ptilorhynchus, 414.
Perrhybris
eleidias, 38.
Petrocossyphus
affinis, 496.
cyanus, 496.
manilla, 496.
solitarius, 496.
Phœoprogne
fusca, 606.
Phaëthon
æthereus, 653.
candidus, 90, 114.
flavirostris, 114, 482.
rubricauda, 482.
Phaner
furcifer, 855.
Phascolomys
angasii, 497.
assimilis, 796.
lasiorhinus, 497, 796.
latifrons, 497, 795, 796.
niger, 796.
platyrhinus, 499, 796.
wombat, 499, 796.
Phasianus
ellioti, 550.
reevesii, 550.
sœmmeringii, 550.
torquatus, 550, 551.
Philepitta
castanea, 867.
Philodromus
albini, 310, 350.
aureolus, 311.
cespiticolis, 311.
fabricii, 310, 350.
medius, 311, 350.
rhomboicus, 309.
setigerus, 310, 350.
thorellii, 309, 310, 350.
Phlegœnas
canifrons, 89, 101.
yapensis, 89, 102.
Phleocryptes
striaticeps, 548.
Phoca
cinerea, 656.

Phoca
forsteri, 654, 657.
jubata, 737.
ursina, 655.
Phœnicophaës
pyrrhocephalus, 405, 433.
Phœnicopterus
andinus, 364.
antiquorum, 479.
ignipalliatus, 364, 549.
roseus, 479.
Pholcus
rivulatus, 277, 348.
Pholeoptynx
cunicularia, 826.
Phrissura
ægis, 51.
polisma, 51.
Phrurolithus
flavipes, 252, 347, 354.
Phrygilus
fruticeti, 537, 548, 550.
Phrynocephalus
caudivolvulus, 387, 390.
forsythii, 390.
helioscopus, 389.
maculatus, 389.
olivieri, 386.
persicus, 388.
Phyllne
erythræa, 11, 15.
Phyllopneuste
brehmi, 25, 26.
montanus, 455, 457.
rufa, 26.
tristrami, 25.
Phyllorhina
armiger, 700, 714.
bicolor, 702.
commersonii, 364.
micropus, 703.
swinhoii, 818.
Phyllornis
jerdoni, 451.
malabaricus, 451.
Phylloscartes
flavocinereus, 542.
Phylloscopus
nitidus, 457.
viridanus, 457.
Phytotoma
rutila, 537, 549.
Picus
macei, 427.
viridis, 666.
Pieris
abyssinica, 58.
acalis, 29.
Pieris
acrisa, 44.
ægis, 51.
ælia, 52.
affinis, 57.
agathina, 37, 54.
agathon, 61.
agave, 44.
ageleis, 35.
aglaope, 65.
agostina, 33.
agrippina, 56.
ajaka, 63.
albina, 49.
amalia, 60.
amaryllis, 41.
amasene, 43.
amba, 59.
anactorie, 54.
anguitia, 39.
antsianaka, 41.
aripa, 41.
aruna, 34.
asterope, 47, 61.
athama, 45.
ausia, 42.
avivolans, 38.
bagoe, 33.
bajura, 34.
balidia, 40.
berenice, 28, 37.
blanca, 33.
boguensis, 56.
boisduvaliana, 57.
brassicæ, var. *nepalensis*, 65.
brassicoides, 64.
buniæ, 42.
cæsia, 40.
caledonica, 44.
calydonia, 42.
canace, 63.
candida, 35.
castoria, 66.
catogramma, 38.
celestina, 45.
charina, 54.
chrysidice, 62.
chrysomelæna, 35.
chrysorrhœa, 29.
cilla, 47.
cinerea, 40.
clemanthe, 28, 60.
clementina, 45.
cleomes, 66.
concinna, 45.
copia, 59.
corneliæ, 28.
coronis, 59.
corva, 59.
crithoë, 29.
Pieris
cruciferarum, 63.
crucivora, 65.
cruentata, 32.
cycinna, 45.
cynis, 55.
daplidice, 565.
darada, 49.
demodice, 67.
demophile, 42.
descombesi, 34.
diana, 43.
dice, 33.
domitia, 46.
dorylæa, 35.
duris, 33.
durvasa, 50.
echidna, 35.
ega, 44.
eleone, 40.
eleonora, 47.
eleusis, 41.
eliada, 46.
elisa, 56.
elodia, 40.
emma, 61.
enarete, 47.
endeis, 42.
enyo, 48.
eperia, 59.
epicharis, 32.
erastus, 57.
eriphia, 67.
erota, 38.
eubotea, 52.
eumelis, 45.
eunoma, 41.
eurymnia, 52.
euthemia, 40.
evonima, 53.
fatime, 46.
figulina, 46.
formosana, 48.
frigida, 64.
gabia, 33.
galathea, 43.
galene, 43.
gayi, 39.
georgina, 36.
gidica, 55.
glaphyra, 66.
glauce, 34.
habra, 42.
hæmorrhœa, 31.
hagar, 43.
helcida, 53.
helena, 41.
helferi, 28.
helvia, 39.
herodias, 35.
hester, 61.

Pieris
higinia, 49.
hippia, 58.
hippo, 48.
hira, 59.
horsfieldii, 30.
hulda, 63.
hyoma, 55.
ianthe, 53.
iberidis, 64.
ida, 50.
ilaire, 49.
illana, 51.
indra, 50.
isandra, 52.
ithome, 47.
jacquinotii, 49.
jael, 60.
joppe, 66.
josepha, 42.
josephina, 41.
kalora, 62.
kicaha, 41.
krueperi, 65.
—, var. *vernalis*, 65.
læta, 60.
lalage, 50.
lanassa, 56.
lara, 32.
laria, 52.
larima, 54.
larissa, 49.
lea, 60.
lenoris, 39.
leptalina, 37.
leptis, 44.
leucania, 39.
leucanthe, 52.
liberia, 46.
libitina, 49.
limnoria, 52.
locusta, 43, 58.
lorena, 38.
lorquinii, 31.
luzoniensis, 31.
lycaste, 48.
lynceola, 48.
lypera, 37.
mahrattensis, 426.
malatha, 49.
malenka, 38.
mananhari, 41.
mandela, 66.
marana, 42.
marchalii, 38.
marginalis, 64.
matuta, 54.
melania, 44.
melete, 64.
menacte, 41.

Pieris
menapia, 58.
mentes, 57.
mesentina, 565.
microdice, 67.
momea, 36.
mysia, 50.
nabellica, 61.
nabis, 57.
nadina, 59.
nama, 59.
naomi, 61.
narses, 57.
nasturtii, 63, 64.
nathalia, 49.
neombo, 43, 44.
nephele, 47, 57.
nera, 39.
nerissa, 49.
nesba, 33.
ninonia, 58.
niscia, 56.
occidentalis, 64.
ocina, 45.
oleracea, 64.
olympia, 41.
orphne, 36.
orseis, 66.
pactolicus, 60.
pallida, 64.
panda, 48.
pandione, 50.
pandosia, 42.
parorcia, 37.
pasion, 39.
pasithoë, 30.
paulina, 44, 50.
peribœa, 33.
periclea, 57.
perictione, 56.
peristhene, 57.
perithea, 57.
peruviana, 52.
phaola, 54.
phileris, 37, 55.
philoma, 40.
philonome, 28, 50.
philyra, 32.
phœbe, 51.
phryxe, 61.
pigea, 54.
pinara, 41.
pisonis, 42.
pitys, 57.
pœcilea, 35.
polisma, 51.
polydice, 67.
polyhymnia, 51.
protocharis, 31.
protodice, 62.
psyche, 43.

Pieris
pylotis, 41.
rachel, 57.
rafta, 64.
rapæ, 65.
—, var. *leucotera*, 65.
remba, 59.
resedæ, 66.
rhenc, 53.
rosenbergii, 31.
rouxii, 49.
rüppellii, 37.
sabina, 53.
sabrata, 54.
salacia, 52.
sanaca, 30.
scyllaria, 56.
semicæsia, 40.
seta, 27, 28.
sevata, 43.
simana, 54.
sisambrii, 63.
si[illegible], 28.
stamnata, 40.
sthenobœa, 34.
suadella, 40.
suasa, 66.
subeida, 53.
sulphurea, 48.
tamar, 60.
taprobana, 565.
tau, 58.
temena, 60.
thaloë, 42.
themis, 33.
theodice, 67.
theora, 53.
thisbe, 29.
thyria, 46.
thysa, 53.
timnatha, 60.
timorensis, 35.
tovaria, 41.
trimenia, 36.
vallei, 66.
vecticlusa, 52.
venosa, 64.
vernalis, 64.
viardi, 38.
vipasa, 565.
virginia, 67.
virginiensis, 63.
vishnu, 35.
wallaceana, 57.
xanthodice, 67.
yreka, 64.
zamboanga, 46.
zamora, 51.
zarinda, 46.
zebuda, 34.

Pieris
zochalia, 55.
zoë, 44.
Pilidium
lineatum, 589.
Pinacopteryx
alba, 54.
doubledayii, 55.
syrinx, 56.
westwoodii, 55.
Piprisoma
agile, 434.
Pitangus
bellicosus, 809.
Pithecia
monachus, 664.
Pithecus
arctoides, 770.
maurus, 722.
Pitta
brachyura, 445.
Platalea
leucorodia, 478.
Platemys
macquaria, 506.
Platessa
flesus, 834, 836.
Platycercus
alpinus, 795.
Platydactylus
borneensis, 589.
guttatus, 589.
pentonopus, 589.
Platypsylla
castoris, 801, 804.
Platypsyllus
castorinus, 801, 804.
Plecotus
auritus, 704, 705.
dargilingensis, 705.
homochrous, 705.
Ploceus
baya, 463.
manyar, 463.
philippinus, 463.
striatus, 463.
Plotus
melanogaster, 483.
Podiceps
major, 549.
pelzelni, 869.
philippensis, 480.
rollandi, 549.
Polioaëtus
ichthyaëtus, 412.
Poliornis
teesa, 69, 78.
Polyborus
tharus, 536.
Polypedates
annectens, 403.
guttatus, 591, 600.
quadrilineatus, 591.
raniceps, 591, 600.
signatus, 591, 600.
Polyphasia
nigra, 431.
passerina, 431.
Pomatorhinus
melanurus, 405, 447.
Pontia
amalia, 60.
aspasia, 61.
calymnia, 59.
casta, 63.
chariclea, 65.
clemanthe, 60.
coreyra, 58.
corva, 59.
cratægi, 58.
emma, 61.
eperia, 59.
feronia, 66.
glauconome, 62.
henningia, 30.
hester, 61.
hippia, 58.
jael, 60.
judith, 61.
læta, 60.
lea, 60.
leucodice, 62.
licea, 60.
mannii, 65.
menapia, 58.
mercedis, 67.
metra, 65.
nadina, 59.
naomi, 61.
narcæa, 65.
nerissa, 59.
notha, 58.
oleracea, 63.
olga, 61.
pactolica, 60.
phryne, 59.
pieridoides, 58.
remba, 59.
sabellicæ, 63.
soracta, 58.
tamar, 60.
temena, 60.
terlooii, 58.
timnatha, 60.
tritogenia, 67.
zeuxippe, 59.
Poospiza
nigro-rufa, 548.
Porella
antarctica, 746, 747.
Porella
cervicornis, 746.
Porphyrio
martinicus, 653.
melanonotus, 90, 107, 108.
pelewensis, 107.
poliocephalus, 475.
Porzana
fusca, 476.
kioloides, 869.
pygmæa, 476.
Pratincola
atrata, 454.
caprata, 454.
Primnoa
antarctica, 746.
lepadifera, 745, 747.
rossii, 744, 745.
Prinia
socialis, 455.
Prioneris
autothisbe, 28.
clemanthe, 28.
cornelicæ, 28.
philonome, 28.
seta, 27, 28.
sita, 28.
thestylis, 27.
vollenhovii, 28.
watsoni, 28.
Prionochilus
vincens, 405, 483, 730.
Procellaria
obscura, 108, 110.
Procodeca
testacea, 574.
Progne
chalybea, 547, 606, 607, 609, 810, 846.
cryptoleuca, 606.
dominicensis, 606.
elegans, 606, 607.
furcata, 606.
purpurea, 547, 548, 549, 605, 606, 607, 846.
subis, 606.
tapera, 606, 607, 608, 609.
Prolemur
simus, 851, 852.
Propithecus
bicolor, 846, 847.
coquerellii, 847.
coronatus, 847.
damonis, 846, 847.
deckenii, 847.
diadema, 846, 847.
edwardsii, 846, 847.
verreauxii, 847.

Proserpina
swiftii, 687.
Prosimia
albifrons, 852.
anjuanensis, 852.
collaris, 852.
nigrifrons, 852.
rufipes, 852.
Psamathia
annæ, 89, 95.
Psammodynastes
pictus, 590.
pulverulentus, 590.
Pseudobufo
subasper, 591.
Pteraster
inflatus, 812.
Pterocyanea
cyanoptera, 368, 370.
Pterocyon
stramineus, 364.
Pteroglossus
wiedi, 862.
Pteromys
magnificus, 635.
Pteropus
assamensis, 691, 692.
dussumieri, 693.
edwardsi, 691.
leucocephalus, 691.
medius, 691.
pyrivorus, 693.
titthæcheilus, 693.
Ptilinopus
pelewensis, 89, 101.
Ptyas
korros, 590.
mucosus, 393.
Ptychozoon
homalocephalum, 589.
Pucrasia
darwini, 552.
macrolopha, 552.
xanthospila, 552, 553.
Puffinus
anglorum, 110, 111.
assimilis, 111, 112.
audubonii, 111, 112.
baillonii, 110.
dichrous, 90, 108, 109, 110, 112.
floridanus, 112.
Gherminieri, 112.
minor, 108.
nugax, 111, 112.
obscurus, 108, 110, 111, 112.
opisthomelas, 108, 109, 110, 112.
yelkuan, 111.
Pupa
plicidens, 515, 518.
ramsayi, 807.
stenopylis, 518.
vara, 518.
(Ennea) *blanfordiana*, 518.
Pupinopsis
morrisonia, 13, 15.
Pycnonotus
flaviricrus, 450.
hæmorrhous, 451.
Pyctorhis
sinensis, 446.
Pyrocephalus
rubineus, 540, 808.
Pyrrhulauda
grisea, 465.
Python
reticulatus, 591.
Pythonopsis
borneensis, 590.
punctata, 590.

Querquedula
brasiliensis, 368, 370.
circia, 479, 480.
crecca, 479, 480.
flavirostris, 367.
maculirostris, 367, 370.
marmorata, 605.
torquata, 367, 368.
Quiscalus
lugubris, 650.

Rachlitia
indica, 590.
Raeta
grayi, 13, 15.
Rallina
amauroptera, 476.
ceylonica, 476.
fasciata, 89, 106, 107.
kioloides, 868.
Rallus
aquaticus, 476.
indicus, 476.
pectoralis, 89, 107.
philippensis, 107.
striatus, 476.
Ramphastos
ariel, 862.
carinatus, 862.
cuvieri, 23.
toco, 862.
vitellinus, 862.
Rana
conspicillata, 591, 597, 600.
cyanophlyctis, 402.
esculenta, 402.
Rana
gracilis, 402, 591.
kuhlii, 598.
macrodon, 598.
tigrina, 591.
Rectes
tenebrosus, 89, 99.
Recurvirostra
avocetta, 474.
Redamia
olivacea, 873.
Reguloides
occipitalis, 25.
proregulus, 25.
superciliosus, 25.
Regulus
cristatus, 25.
Rhabdion
borneensis, 590.
Rhacophorus
maculatus, 403.
pardalis, 591.
reinwardtii, 403.
Rhamphocinclus
brachyurus, 648.
Rhea
americana, 535.
darwini, 534, 535.
Rhinoceros
bicornis, 791.
lasiotis, 493, 790, 791, 792, 794.
sondaicus, 132.
sumatrensis, 129, 132, 185, 493, 790, 791, 793, 794.
unicornis, 791.
Rhinocrypta
lanceolata, 543, 548, 549.
petersi, 700.
rouxii, 697, 698.
tragatus, 697, 698.
Rhinolophus
affinis, 696, 701.
armiger, 700.
bicolor, 702.
ferrum-equinum, 698.
lucius, 694, 695, 701, 714.
macrotis, 699, 703.
minor, 698, 714.
perniger, 694, 695.
Rhipidura
lepida, 89, 97.
nebulosa, 97.
torrida, 97.
versicolor, 89, 96.
Rhodia
newara, 578.
Rhynchæa
bengalensis, 473.

Rhynchotus
rufescens, 546.
Ringicula
minuta, 11, 15.
melanictera, 405, 451.
Rucervus
schomburgki, 798.
Rumina
(Stenogyra) *pairensis*, 685, 687.

Saiga
tatarica, 643.
Saimiris
entomophaga, 3, 9.
sciurea, 3, 664, 688, 689.
usta, 688, 689.
Salmo
fario, 834.
ferox, 834, 836.
fontinalis, 834, 836.
salar, 834, 836.
Saltator
guadelupensis, 649.
Salticus
adansonii, 324, 333.
æratus, 339.
affinis, 322.
albobimaculatus, 322.
approximans, 337, 338.
arenicolor, 322.
bresnieri, 323, 350.
candidus, 322.
canescens, 323.
castaneus, 321.
capreolus, 322.
cephalotes, 321.
clemens, 335.
cognatus, 337.
congener, 332.
conveniens, 336, 337.
curvidens, 345.
delectus, 326, 328, 329.
dentatidens, 346.
devorans, 327.
diagonalis, 321.
dumicolus, 341.
epularis, 329.
facetus, 344, 345.
fasciatus, 322.
flavescens, 343.
frontalis, 336.
fulgens, 340, 352.
fulvaster, 322.
furcatus, 346.
gambosus, 323, 352.
hæmorrhoicus, 321.
heliophanoïdes, 328.
indistinctus, 342.
infimus, 324.
lævigatus, 322.

Salticus
latifasciatus, 322.
lineatus, 322.
melinus, 324.
monardi, 322.
mordax, 344, 346.
multipunctatus, 323.
nepos, 333.
ostrinus, 322.
particeps, 330.
pascualis, 334.
patagiatus, 332.
paykullii, 323, 327.
politiventris, 337, 338, 339.
putus, 326.
quinquepartitus, 322.
regillus, 323.
reticulatus, 336.
sanguinolentus, 321.
semiater, 323.
simonii, 329.
spiniger, 339.
staintonii, 331, 332, 352.
tenerus, 324.
todillus, 324, 352.
tricinctus, 324.
vaillantii, 323, 327, 328.
vigoratus, 324.
(Attus) *æratus*, 351.
(——) *affinis*, 350.
(——) *albobimaculatus*, 350.
(——) *approximans*, 351.
(——) *arenicolor*, 350.
(——) *bresnieri*, 350.
(——) *candidus*, 350.
(——) *canescens*, 350.
(——) *capreolus*, 350.
(——) *castaneus*, 350.
(——) *cephalotes*, 350.
(——) *clemens*, 351.
(——) *cognatus*, 351.
(——) *congener*, 351.
(——) *conveniens*, 351.
(——) *delectus*, 351.
(——) *devorans*, 351.
(——) *diagonalis*, 350.
(——) *epularis*, 351.
(——) *fasciatus*, 350.
(——) *fulgens*, 351.
(——) *fulvaster*, 350.
(——) *gambosus*, 350.
(——) *hæmorrhoicus*, 350.
(——) *heliophanoïdes*, 351.
(——) *lævigatus*, 350.
(——) *latifasciatus*, 350.

Salticus
(Attus) *lineatus*, 350.
(——) *monardi*, 350.
(——) *multipunctatus*, 350.
(——) *nepos*, 351.
(——) *ostrinus*, 350.
(——) *particeps*, 351.
(——) *pascualis*, 351.
(——) *patagiatus*, 351.
(——) *paykullii*, 350.
(——) *politiventris*, 351.
(——) *putus*, 351.
(——) *quinquepartitus*, 350.
(——) *regillus*, 351.
(——) *sanguinolentus*, 350.
(——) *semiater*, 350.
(——) *simonii*, 351.
(——) *spiniger*, 351.
(——) *staintonii*, 351.
(——) *vaillantii*, 350.
(Calliethérus) *infimus*, 351.
(——) *tenerus*, 351.
(——) *tricinctus*, 351.
(Dendryphantes) *dumicolus*, 351.
(Heliophanus) *curvidens*, 351.
(——) *dentatidens*, 351.
(——) *facetus*, 351.
(——) *furcatus*, 351.
(——) *melinus*, 351.
(——) *mordax*, 351.
(——) *todillus*, 351.
(Menemerus) *flavescens*, 351.
(——) *indistinctus*, 351.
(——) *vigoratus*, 351.
(Plexippus) *adansonii*, 351.
(Rhanis) *insignis*, 324, 351.
Sarcidiornis
regia, 365, 370.
Sarciophorus
bilobus, 472.
malabaricus, 472.
Sarkidiornis
melanonotus, 479, 480.
Scapha
deshayesii, 23.
mamilla, 23.
punctata, 23.
Scapharca
pygmæa, 11, 15.
Scaphella
marmorata, 23.

Scaphula
bensoni, 14, 15.
Scapia
falconeri, 139.
Scissurella
paumotuensis, 878.
Sciurocheirus
allenii, 857, 858.
Sciurus
castaneiventris, 818.
chinensis, 818.
griseipectus, 818.
m'clellandi, 818.
Scolopax
rusticula, 472.
Scops
aldrovandi, 81.
madagascariensis, 868.
rutilus, 868.
Scotophilus
discolor, 706.
fulvus, 705.
leisleri, 706.
lobatus, 706.
murinus, 706.
serotinus, 706.
temminckii, 705, 706.
Scytodes
thoracica, 276, 348.
Seena
aurantia, 480.
Segestria
perfida, 223, 347.
Selenops
omalosoma, 314, 350.
Semicassis
saburon, 837.
(Casmaria) *achatina*, 838.
(——) *paucirugis*, 838.
(——) *pyrum*, 838.
(——) *sophiæ*, 838.
(——) *torquata*, 838.
(Phalium) *areola*, 837.
(——) *coronulata*, 838.
Separatista
blainvilleana, 878.
quadricarinata, 878.
stellaris, 878.
Serpophaga
sp., 542, 543.
nigricans, 543.
Simia
cuvieri, 722.
Simotes
labuanensis, 590.
octolineatus, 590.
russellii, 392.
signatus, 595.
subcarinatus, 590, 595, 600.
Simotes
vertebralis, 590.
Simpulopsis
mastersi, 619.
Smerinthus
decoratus, 568.
Sorex
myosurus, 818.
Sparassus
linnæi, 312, 350.
ornatus, 312, 350.
smaragdulus, 312, 350
walckenaërius, 311, 350.
Spathodactylus
mutilatus, 594.
Spatula
clypeata, 479.
platalea, 368, 370.
Spheniscus
humboldti, 604.
minor, 636.
Spilornis
bacha, 412.
cheela, 77.
spilogaster, 412.
Spilosoma
brunnea, 574.
dentilinea, 573.
todara, 574.
Spizaëtus
limnaëtus, 411.
Stellio
himalayensis, 384.
persicus, 382.
Sterna
frontalis, 113.
gracilis, 406, 409, 481.
hirundo, 481.
leucocapilla, 114.
leucoptera, 481.
longipennis, 90, 112, 113.
lunata, 90, 113.
melanauchen, 89, 90, 113.
melanogaster, 481.
nigra, 481.
senex, 113.
tenuirostris, 113, 114.
Sternula
minuta, 481.
sinensis, 481.
sumatrana, 481.
Stigmatura
budytoides, 542.
flavocinerea, 540, 542, 549.
Stomatella
scitula, 10, 15.
Strepsilas
interpres, 89, 104, 472.
Stringops
habroptilus, 185, 788.
Strix
bakkamuna, 417.
candida, 415.
indica, 80, 415.
javanica, 415.
Struthidea
cinerea, 603.
Struthio
camelus, 356, 361.
Sturnella
militaris, 548, 550.
Stylodonta
semicerina, 12.
(Erepta) *bewsheri*, 12, 15.
Sula
fiber, 482.
Surniculus
dicruroides, 431.
Sydella
australis, 747.
Sylochelidon
caspia, 480.
Sylvia
affinis, 457.
Symbrenthia
brabira, 558.
hypselis, 558.
niphanda, 559.
Synallaxis
egithaloides, 544.
modesta, 544, 548, 549.
patagonica, 544, 548, 549.
sordida, 543, 548.
striaticeps, 544.
sulphurifera, 544, 548.
Synchloë
aglaope, 65.
ajaka, 63.
autodice, 67.
brassicæ, 65.
brassicoides, 64.
callidice, 62.
canace, 63.
canidia, 66.
castoria, 66.
cheiranthi, 65.
chloridice, 62.
cleomes, 66.
cruciferarum, 63.
crucivora, 65.
daplidice, 62.
ergane, 65.
frigida, 64.
glauconome, 62

Synchloë
hellica, 62.
hulda, 63.
joppe, 66.
krueperi, 65.
leucodice, 62.
marginalis, 64.
melete, 64.
monuste, 66.
napi, 63.
nasturtii, 63.
nepalensis, 65.
occidentalis, 64.
oleracea, 63.
pallida, 64.
protodice, 62.
rapæ, 65, 66.
sisymbrii, 63.
suasa, 66.
venosa, 64.
vernalis, 64.
virginia, 67.
virginiensis, 63.
Syngnathus
typhle, 834, 836.
Syrnium
indrance, 415.

Taccocua
leschenaultii, 433.
Tachydromus
sexlineatus, 588.
Tachypetes
minor, 87, 90.
Tachyris
abnormis, 48.
alope, 43.
amarella, 44.
bouruensis, 46.
corinna, 45.
cynisca, 45.
galba, 46.
jacquinotii, 44.
lucasii, 50.
panthea, 48.
urania, 44.
Tænioptera
coronata, 548.
murina, 541, 548, 549.
rubetra, 541, 548.
Tanagra
striata, 537.
Tantalus
leucocephalus, 478.
Tanysiptera
riedeli, 1.
Tapirus
ænigmaticus, 489, 625.
americanus, 605.
bairdi, 635.
ecuadorensis, 492, 625.
Tapirus
leucogenys, 483, 484, 487, 488, 489, 490, 491, 492.
peruvianus, 624, 625.
pinchacus, 484, 485, 486, 487, 488, 489, 491.
roulini, 487, 488, 604, 605.
terrestris, 484, 487, 489, 491, 492, 604, 624, 625, 636.
villosus, 487, 488.
Tarentola
borneensis, 589.
Tatochila
autodice, 67.
demodice, 67.
mercedis, 67.
microdice, 67.
theodice, 67.
xanthodice, 67.
Tchitrea
paradisi, 440.
Tegenaria
annulipes, 275, 348.
domestica, 275.
intricata, 274, 348.
Teleopus
luxatus, 140.
Temenuchus
albofrontatus, 462.
pagodarum, 462.
senex, 405, 462.
Tephras
finschi, 96.
Tephrodornis
affinis, 437.
pondiceriana, 437.
Terekia
cinerea, 474.
Terias
rama, 566.
venata, 566.
Terpsiphone
mulata, 867.
Testudo
elegans, 862.
elongata, 615.
emys, 133, 135, 138, 139, 140.
forstenii, 615, 616.
indica, 140.
pardalis, 184.
phayrei, 132, 133, 134, 135, 136, 138, 139, 140, 143.
semiserrata, 184.
(Scapia) *falconeri*, 140.
Tethea
ingalli, 115, 119, 128.
lyncurium, 115, 117.
muricata, 115, 116, 127, 128.
norvagica, 121, 128.
unca, 118, 128.
Tetragnatha
decora, 296.
extensa, 295, 296, 297.
miniitabunda, 296, 349.
molesta, 295, 296, 349.
perlongipes, 296, 349.
Tetragonosoma
effrene, 591.
Textrix
inornata, 274, 348.
lycosina, 274.
puta, 274, 348.
Thalasseus
bengalensis, 482.
cristatus, 481.
medius, 482.
Thalassidroma
—— ?, 480.
Thalotia
woodsiana, 611, 614.
Thamnobia
fulicata, 454.
Theophila
huttoni, 576.
mandarina, 576, 582.
Theridion
acuminatum, 281, 282, 283, 348.
albocinctum, 281, 348.
apicatum, 281, 348.
conspicuum, 285, 349, 352.
denticulatum, 280, 348.
erigoniforme, 284, 349.
fictilium, 278.
flavo-maculatum, 281, 348.
guttatum, 285.
inscriptum, 284, 349.
lutipes, 280, 348.
mandibulare, 285.
particeps, 282, 284, 349.
pulchellum, 280.
4-*punctatum*, 285.
rufolineatum, 280.
scriptum, 283, 349.
sexalbomaculatum, 282.
simile, 281, 348.

Theridion
spirifer, 280, 348.
stictum, 285.
varians, 280, 348.
venustum, 281, 348.
uncinatum, 281.
Thomisus
abbreviatus, 308, 309, 350.
audax, 303, 304, 305.
buffonii, 307, 308, 349.
claveatus, 305, 306.
claviger, 306, 349.
confluens, 305, 349.
cristatus, 303, 349.
diana, 306, 349.
edax, 303, 349.
græcus, 303, 305, 349.
hirtus, 308.
lateralis, 308, 349.
peronii, 308, 350.
plorator, 306, 349.
rectilineus, 306, 349.
rhomboicus, 309.
rigidus, 305, 306, 349.
rotundatus, 306, 307, 349.
sabulosus, 304.
setiger, 215, 307, 349, 352.
simplex, 305.
spinifer, 308, 350, 352.
tristrami, 304, 305, 349, 352.
trux, 305.
varius, 303, 349.
versutus, 305.
viaticus, 303.
Thouarella
antarctica, 745, 746, 747.
Thracia
alciope, 611, 614.
Threskiornis
leucocephalus, 479.
melanocephalus, 479.
Thyca
berinda, 566.
devaca, 566.
echo, 34.
ennia, 33.
fragalactea, 31.
hierte, 566.
—, var. *indica*, 31.
hippodamia, 35.
horsfieldi, 566.
ithiela, 30.
lucerna, 30.
ninus, 29.
ochreopicta, 30.
Thyca
pandemia, 30.
parthenope, 29.
philotis, 32.
pyramus, 29.
singhapura, 33.
Thylacinus
cynocephalus, 355.
Thymallus
vulgaris, 834.
Tiaris
bellii, 593.
borneensis, 589.
dilophus, 593.
liogaster, 589, 592, 600.
miotympanum, 589, 592, 600.
petersii, 593.
sophiæ, 593, 600.
tuberculatus, 593, 600.
Tiliqua
præornata, 589.
rufescens, 588.
Tinnunculus
alaudarius, 410.
sparverius, 536, 552.
Toccus
melanoleucus, 16.
Tockus
gingalensis, 405, 425.
griseus, 425.
Todus
viridis, 665, 671, 673, 674, 675, 676, 680.
Tornatellina
inconspicua, 619.
jacksonensis, 807.
Tornatina
inconspicua, 11, 15.
Totanus
calidris, 475.
fuscus, 475.
glottis, 475.
stagnatilis, 475.
Trachelas
minor, 256, 348, 354.
Tragops
prasinus, 590.
Tragulus
javanicus, 640.
Trapelus
ruderatus, 384.
Tribonyx
gouldi, 861.
mortieri, 861.
Trigla
hirundo, 834.
Trimeresurus
monticola, 401.
wagleri, 591.
Tringa
acuminata, 89, 106.
glareola, 106.
minuta, 89, 106, 474.
platyrhyncha, 474.
salina, 474.
subarquata, 474.
subminuta, 474.
Tringoides
macularius, 653.
Trionyx
javanicus, 588.
subplanus, 588.
Triton
(Epidromus) *coxi*, 22, 23.
Tritonidea
petterdi, 22.
Trivia
australis, 86.
candidula, 86.
globosa, 86.
insecta, 86.
limacina, 86.
staphylæa, 86.
Tropidonotus
conspicillatus, 590, 596.
flaviceps, 590.
hydrus, 394.
leucomelas, 590.
maculatus, 590, 596.
natrix, 393.
quincunciatus, 590.
rhodomelas, 590.
sarawacensis, 590, 596.
stolatus, 393, 590.
sundanensis, 590.
trianguligerus, 590.
Tubulipora
nivalis, 745, 747.
Turdulus
wardii, 445.
Turdus
falklandicus, 548, 550.
obscurus, 89, 96.
pallens, 96.
pallidus, 96.
pœcilopterus, 24.
Turnix
taigoor, 470.
Turricula
(Costellaria) *pharaonis*, 9, 15.
(Thala) *casta*, 9, 15.
Turritella
alba, 9, 15.
Turtur
orientalis, 467.
risoria, 467.
rupicola, 467

Turtur
suratensis, 467.
Typhlocalamus
gracillimus, 589.
Typhlops
braminus, 589.
Tyrannus
rostratus, 651.

Uloborus
plumipes, 303, 349.
walckenaërius, 302, 349.
Upucerthia
dumetoria, 544, 548.
Upupa
epops, 436.
nigripennis, 435, 436.
senegalensis, 435.
Urva
cancrivora, 817.

Vanessa
cashmirensis, 559.
rizana, 559.
Vanga
polleni, 867.
Varanus
cumingii, 145.
Varecia
leucocephalus, 853.
niger, 853.
Veleda
lineata, 303.
Venus
gladstonensis, 612, 614.
laqueata, 612.
Vespertilio
adversus, 710.
auritus, 704.
barbastellus, 703.
blythii, 691, 709, 714.
formosa, 711.
marginatus, 693.
Vespertilio
minor, 704.
muricola, 710.
nattereri, 790.
pipistrellus, 713.
Vesperugo
imbricatus, 707.
leisleri, 707.
micropus, 708, 710.
Vireosylvia
calidris, 649.
Viverra
fossa, 872.
rasse, 872.
zibetha, 817.
Viverricula
indica, 862.
malaccensis, 817.
schlegeli, 862.
Volvocivora
sykesii, 437.
Voluta
(Aulica) *hargreavesi*, 613, 614.

Walckenaëra
aggeris, 293, 753, 755.
cristata, 767.
humilis, 751.
ignobilis, 293, 755.
implana, 765.
latifrons, 762, 767.
minima, 763.
nemoralis, 293, 765.
picina, 763.
pusilla, 763.
unicornis, 759.

Xantholæma
indica, 430.
rubricapilla, 405, 430.
Xema
brunnicephala, 480.
Xenelaphis
hexahonotus, 590.
Xenopeltis
unicolor, 589.
Xenopirostris
polleni, 867.

Yungipicus
gymnophthalmos, 427.

Zafra
pupoidea, 14, 15.
Zalophus
gillespii, 662.
Zamenis
caudolineatus, 393.
cliffordii, 393.
ladacensis, 393.
persicus, 393.
Zanclostomus
viridirostris, 432.
Zaocys
carinatus, 590.
fuscus, 590.
Zonotrichia
albicollis, 681.
pileata, 548.
Zoothera
imbricata, 446.
Zosterops
annulosus, 459.
ceylonensis, 405, 408, 459, 460.
cinerea, 96.
conspicillata, 95.
finschi, 89, 96.
hypolais, 89, 95.
meyeni, 95.
oleaginea, 89, 95, 96.
palpebrosus, 458, 459, 460.
semperi, 89, 95.

THE END.

PRINTED BY TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

260673

LIST OF THE PUBLICATIONS

OF THE

ZOOLOGICAL SOCIETY OF LONDON.

THE scientific publications of the Zoological Society are of two kinds — "Proceedings," published in an octavo form, and "Transactions," in quarto.

According to the present arrangements, the "Proceedings" contain not only notices of all business transacted at the scientific meetings, but also all the papers read at such meetings and recommended to be published by the Committee of Publication. From forty to fifty coloured plates and engravings are attached to each annual volume of the "Proceedings," to illustrate the new or otherwise remarkable species of animals described in them. Amongst such illustrations, figures of the new or rare species acquired in a living state for the Society's Gardens are often given.

The "Proceedings" for each year are issued in three parts, in the months of May, October, and March, the part published in March completing the volume for the preceding year. They may be obtained with black or coloured illustrations.

The "Transactions" contain such of the more important communications made to the scientific meetings of the Society as, on account of the nature of the plates required to illustrate them, are better adapted for publication in the quarto form. The numerous papers of Professor Owen on the Anthropoid Apes, and on the various species of *Dinornis*, all form part of this series.

Fellows, and Honorary, Foreign, and Corresponding Members, upon payment of a Subscription of £1 1*s*. before the day of the Anniversary Meeting in each year, are entitled to receive all the Society's Publications for the year. They are likewise entitled to purchase the Publications of the Society at 25 per cent. less than the price charged for them to the Public. A further reduction of 25 per cent. is made upon purchases of Publications issued prior to 1861, if they exceed the value of five pounds.

The following is a complete list of the publications of the Society already issued. They may be obtained at the Society's Office (11 Hanover Square, W.), at Messrs. Longmans' the Society's publishers (Paternoster Row, E.C.), or through any bookseller:—

[March 1873.]

PROCEEDINGS OF THE COMMITTEE OF SCIENCE AND CORRESPONDENCE OF THE ZOOLOGICAL SOCIETY OF LONDON.

8vo. 2 vols.

			To Fellows.	To the Public.
Part I.	1830–31.	1 vol. 8vo. ..... Price	4s. 6d.	... 6s.
„ II.	1832.	„ ..... „	4s. 6d.	... 6s.

PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON.

8vo. 15 vols. and Index. (First Series.)

			Price to Fellows.	Price to the Public.
Part I.	1833.	1 vol. 8vo.	4s. 6d.	... 6s.
„ II.	1834.	„	4s. 6d.	... 6s.
„ III.	1835.	„	4s. 6d.	... 6s.
„ IV.	1836.	„	4s. 6d.	... 6s.
„ V.	1837.	„	4s. 6d.	... 6s.
„ VI.	1838.	„	4s. 6d.	... 6s.
„ VII.	1839.	„	4s. 6d.	... 6s.
„ VIII.	1840.	„	4s. 6d.	... 6s.
Part IX.	1841.	1 vol. 8vo.	4s. 6d.	... 6s.
„ X.	1842.	(out of print)		
„ XI.	1843.	1 vol. 8vo.	4s. 6d.	... 6s.
„ XII.	1844.	„	4s. 6d.	... 6s.
„ XIII.	1845.	„	4s. 6d.	... 6s.
„ XIV.	1846.	„	4s. 6d.	... 6s.
„ XV.	1847.	„	4s. 6d.	... 6s.
Index	1830–47.	„	4s. 6d.	... 6s.

PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON.

8vo. 13 vols. and Index. (Second Series.)

			Without Illustrations. To Fellows.	Without Illustrations. To the Public.		With Illustrations. To Fellows. £ s. d.	With Illustrations. To the Public. £ s. d.
Part XVI.	1848.	1 vol. 8vo.	4s. 6d.	... 6s.	... Price	1 1 0	... 1 7 6
„ XVII.	1849.	„	4s. 6d.	... 6s.	... „	1 1 0	... 1 7 6
„ XVIII.	1850.	„	4s. 6d.	... 6s.	... „	1 7 6	... 1 18 0
„ XIX.	1851.	„	4s. 6d.	... 6s.	... „	0 16 0	... 1 1 0
„ XX.	1852.	„	4s. 6d.	... 6s.	... „	0 16 0	... 1 1 0
„ XXI.	1853.	„	4s. 6d.	... 6s.	... „	0 18 0	... 1 4 0
„ XXII.	1854.	„	4s. 6d.	... 6s.	... „	1 0 0	... 1 6 0
„ XXIII.	1855.	„	4s. 6d.	... 6s.	... „	1 7 6	... 1 18 0
„ XXIV.	1856.	„	4s. 6d.	... 6s.	... „	1 1 0	... 1 7 6
„ XXV.	1857.	„	4s. 6d.	... 6s.	... „	1 1 0	... 1 7 6
„ XXVI.	1858.	„	4s. 6d.	... 6s.	... „	1 12 0	... 2 2 0
„ XXVII.	1859.	„	4s. 6d.	... 6s.	... „	1 12 0	... 2 2 0
„ XXVIII.	1860.	„	4s. 6d	... 6s.	... „	1 12 0	... 2 2 0
Index	1848–60.	„	4s. 6d.	.. 6s	... „	0 4 6	... 0 6 0

ILLUSTRATIONS TO THE PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON, 1848–60. 8vo. 6 vols.

					To Fellows. £ s. d.	To the Public. £ s. d.
Mammalia	1 vol.,	containing	83 Plates	... Price	2 8 0	... 3 3 0
Aves	2 vols.,	„	173 „	... „	4 15 0	... 6 6 0
Reptilia et Pisces ...	1 vol.,	„	43 „	... „	1 3 0	... 1 10 6
Mollusca.....	1 vol.,	„	51 „	... „	1 3 0	... 1 10 6
Annulosa et Radiata	1 vol.,	„	90 „	... „	2 8 0	... 3 3 0

PROCEEDINGS OF THE SCIENTIFIC MEETINGS OF THE ZOOLOGICAL SOCIETY OF LONDON. 8vo.

	Complete. To Fellows.	Complete. To the Public.	Letterpress only. To Fellows.	Letterpress only. To the Public.	Illustrations only. To Fellows.	Illustrations only. To the Public.
1861, cloth	32*s*.	47*s*.	4*s*. 6*d*.	6*s*.	27*s*. 6*d*.	41*s*.
1862, „	32*s*.	47*s*.	4*s*. 6*d*.	6*s*.	27*s*. 6*d*.	41*s*.
1863, „	32*s*.	47*s*.	4*s*. 6*d*.	6*s*.	27*s*. 6*d*.	41*s*.
1864, „	32*s*.	47*s*.	4*s*. 6*d*.	6*s*.	27*s*. 6*d*.	41*s*.
1865, „	32*s*.	47*s*.	4*s*. 6*d*.	6*s*.	27*s*. 6*d*.	41*s*.
1866, „	32*s*.	47*s*.	4*s*. 6*d*.	6*s*.	27*s*. 6*d*.	41*s*.

	With Illustrations Uncoloured. To Fellows.	With Illustrations Uncoloured. To the Public.	With Illustrations Coloured. To Fellows.	With Illustrations Coloured. To the Public.
1867, cloth	11*s*. 6*d*.	14*s*. 6*d*.	32*s*. 6*d*.	47*s*. 6*d*.
1868, „	11*s*. 6*d*.	14*s*. 6*d*.	32*s*. 6*d*.	47*s*. 6*d*.
1869, „	11*s*. 6*d*.	14*s*. 6*d*.	32*s*. 6*d*.	47*s*. 6*d*.
1870, „	11*s*. 6*d*.	14*s*. 6*d*.	32*s*. 6*d*.	47*s*. 6*d*.
1871, „	11*s*. 6*d*.	14*s*. 6*d*.	32*s*. 6*d*.	47*s*. 6*d*.
1872, „	11*s*. 6*d*.	14*s*. 6*d*.	32*s*. 6*d*.	47*s*. 6*d*.

TRANSACTIONS OF THE ZOOLOGICAL SOCIETY OF LONDON. 4to. 7 vols. and Two Parts.

		To Fellows. £	s.	d.		To the Public. £	s.	d.
Vol. I., containing 59 Plates	Price	3	13	6	...	4	18	0
Vol. II., „ 71 „	„	4	0	0	...	5	6	6
Vol. III., „ 63 „	„	3	8	6	...	4	11	0
Vol. IV., „ 78 „	„	6	2	0	...	8	2	6
Vol. V., „ 67 „	„	5	3	6	...	6	19	0
Vol. VI., „ 91 „	„	11	5	0	...	15	0	6
Vol. VII., „ 73 „	„	8	17	0	...	11	16	0
Vol. VIII., Part 1 2 „	„	0	10	6	...	0	14	0
Vol. VIII., „ 2 11 „	„	1	11	6	...	2	2	0
Vol. VIII., „ 3 16 „	„	1	7	0	...	1	16	0

The following are the contents of the most recently published Part of the "Transactions":—

Vol. VIII. Part 3. Price 36*s*. "On Dinornis" (Part XVII.). By Professor Owen, F.R.S. (3 Plates.)—"On the Form and Structure of the Manatee (*Manatus americanus*)." By James Murie. (10 Plates.)—"On the recent Ziphioid Whales, with a Description of the Skeleton of *Berardius arnouxi*." By W. H. Flower, F.R.S. (3 Plates.)

REVISED LIST OF THE VERTEBRATED ANIMALS NOW OR LATELY LIVING IN THE GARDENS OF THE ZOOLOGICAL SOCIETY OF LONDON, 1872.

This List contains the scientific and vernacular names of all the species of Vertebrates in the Society's collection, arranged in systematic order, and forms a complete record of all the specimens that have been exhibited alive in the Society's Gardens during the past ten years. The total number of the species is as follows:—Mammals 498, Birds 1044, Reptiles 181, Batrachians 35, Fishes 68; total 1826.

These publications may be obtained at the Society's Office (11 Hanover Square, W.), at Messrs. Longmans', the Society's publishers (Paternoster Row, E.C.), or through any bookseller.

Fellows, Honorary, Foreign, and Corresponding Members of the Society, who pay a Subscription of £1 1*s*. before the day of the Anniversary Meeting (April 29th) in each year, are entitled to receive all the Society's Publications for the year. They are likewise entitled to purchase the Publications of the Society at 25 per cent. less than the price charged for them to the Public. A further reduction of 25 per cent. is made upon purchases of Publications issued prior to 1861, if they exceed the value of five pounds.